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# AMERICAN JOURNAL OF OPHTHALMOLOGY

SERIES 3—VOLUME 1

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PUBLISHED BY THE OPHTHALMIC PUBLISHING COMPANY,


7 West Madison Street, Chicago, Illinois.





# PLATES IN VOLUME 1, 1918.

	Adjoining Page
Plate I. Essential Atrophy of Iris, Colors .....	1
Plate II. Essential Atrophy of Iris, Microphotographs .....	8
Plate III. Essential Atrophy of Iris, Microphotographs .....	9
Plate IV. Aneurisms of the Retinal Arteries, Colors .....	12
Plate V. Hole in Macula in Negro, Colors.....	81
Plate VI. Melanoblastoma of the Eye, Microphotographs.....	96
Plate VII. Melanoblastoma of the Eye, Microphotographs .....	97
Plate VIII. Neuroblastoma of Retina, Microphotographs .....	234
Plate IX. Blue Cataract, Colors .....	360
Plate X. X-ray Picture Showing Sella Turcica .....	400
Plate XI. Pemphigus of Conjunctiva, Colors .....	545
Plate XII. Metastatic Endophthalmitis, Microphotographs .....	648
Plate XIII. Metastatic Endophthalmitis, Microphotographs .....	649
Plate XIV. Characteristic Lesion of Parinaud's Conjunctivitis, Colors..	705
Plate XV. Antero-Posterior Roentgenograph of Tower Skull.....	763
Plate XVI. Lateral Roentgenograph of Tower Skull.....	763
Plate XVII. Obliteration of Choroidal Vessels, and Avulsion of Optic Nerve, Colors .....	777
Plate XVIII. Inflammatory Mass Simulating Sarcoma of Choroid. Micro- photographs .....	824
Plate XIX. Inflammatory Deposits Resembling Intraocular Tumor. Microphotographs .....	825



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# INDEX OF NAMES

- Abadie, C., 221, 623.  
 Abbott, W. A., 71.  
 Abecassis, A., 812.  
 Abelsdorff, 813.  
 Achney, W. de W., 463.  
 Achard, 391, 543.  
 Adams, P. H., 814.  
 Adams, W. H., 752.  
 Adson, A. W., 751.  
 Affolter, A., 387.  
 Akatsuka, 387, 391.  
 Alajmo, L., 749.  
 Alexander, G. F., 461, 878.  
 Alger, E. M., 811.  
 Allen, F. J., 463.  
 Allport, F., 79, 160, 216, 300, 336, 345, 350,  
 388, 389, 391, 412, 462, 464, 543, 544, 573, 621,  
 702, 803, 813, 880.  
 Alperin, D., 219.  
 Alt, A., 146, 193, 302.  
 Amalric, 274, 391.  
 Amoretti, E., 388.  
 Andersen, C. L., 461.  
 Anderson, H. G., 392.  
 Andrade, C. de, 389.  
 Andrews, B. F., 137, 139, 302.  
 Andrews, J. A., 745, 880.  
 Anduyned, 78, 370, 462, 879.  
 Angelucci, A., 269, 390.  
 Appleman, L. F., 24, 158.  
 Arana, F., 702.  
 Argañaraz, R., 79, 194, 300, 389, 390, 541, 748,  
 Armstrong, W. E. M., 157.  
 Ascher, K. W., 751.  
 Ask, F., 812.  
 Aubineau, E., 701, 812.  
 Aufmwasser, H. W., 719.  
 Augstein, H., 159.  
 Avata, A. A., 752.  
 Axenfeld, T., 748, 879.  
 Aymard, J. L., 370.  
 Ayraud, G. E., 620.  
 Bachstesz, E., 747, 812, 815.  
 Bail, O., 702.  
 Bailey, F. W., 436.  
 Bailliant, P., 158, 300, 702, 814.  
 Bamberger, 811.  
 Bane, W. C., 17, 20, 143, 144, 159, 343, 445,  
 512, 513, 584, 585, 586, 619, 620, 623, 702.  
 Banos y Brena, F., 77.  
 Bárány, 541.  
 Barbezat v les Bayards, 815.  
 Barbieri, N. A., 542.  
 Bard, L., 811.  
 Bardsley, P. C., 463, 575, 620, 701, 813.  
 Barkan, H., 391.  
 Barker, L. F., 703.  
 Barraquer, I., 78, 220,, 370, 462, 879.  
 Barrett, J. W., 870.  
 Basterra y Santa Cruz, 78, 299, 390, 879, 880.  
 Bates, W. H., 461.  
 Baudouin, M., 623.  
 Baumeister, 78.  
 Baumgärtner, H., 752.  
 Bayliss, W. M., 463.  
 Beaumont, W. M., 77, 619.  
 Beck, E. G., 747.  
 Bedell, A. J., 311, 463.  
 Beeman, C. E., 752.  
 Behr, C., 390, 750.  
 Belgeri, F., 79, 158, 194.  
 Bell, G. H., 159, 300, 301, 302, 622.  
 Bell, P. G., 543.  
 Benjamins, C. E., 703.  
 Bentzen, C. F., 812.  
 Bérard, L., 391.  
 Berens, 816, 880.  
 Bergmann, 813.  
 Bernstein, E. J., 79, 156.  
 Berrisford, P. D., 879, 880.  
 Berry, G. A., 213, 221.  
 Best, F., 751, 813.  
 Bichon, 607, 701.  
 Billstrom, J., 79.  
 Binet, 391, 543.  
 Birch-Hirschfeld, A., 158, 750, 752.  
 Birch-Hirschfeld, G., 391.  
 Blaauw, E. E., 267, 369, 429, 518, 607, 674.  
 Black, M., 87, 120, 141, 142, 143, 144, 265, 300,  
 301, 302, 340, 341, 342, 344, 443, 444, 445,  
 446, 462, 514, 584, 585, 586, 621, 815.  
 Black, N. M., 154, 464.  
 Blackwood, J. M., 784, 880.  
 Blair, W. W., 153.  
 Blake, E. M., 787, 880.  
 Blanco, T., 387.  
 Blaskovics, L. V., 622.  
 Blatt, 815.  
 Bledsoe, R. W., 136.  
 Blegvad, O., 461, 748.  
 Bloch, C. E., 620, 748.  
 Blum, H. N., 158.  
 Boas, K., 541.  
 Boegehold, H., 748.  
 Boehmig, 813.  
 Bollack, J., 542.  
 Bolten, G. C., 462.  
 Bonnefon, 300, 812.  
 Bonner, H. M., 156.  
 Bookwalter, C. F., 622.  
 Boot, G. W., 350, 352, 463, 815.  
 Bordley, J. Jr., 77, 544.  
 Boulai, 703.  
 Bourdier, F., 878.  
 Bourgeois, A., 77, 80, 623.  
 Boyd, E. T., 339, 340, 344, 462, 512, 513, 514.  
 Boyd, F. D., 130, 134.  
 Bram, I., 464.  
 Bramwell, B., 463.  
 Brandeis, J. W., 158.  
 Braum, A., 73.  
 Brav, A., 79, 300, 542, 621, 687, 702.  
 Brawley, F., 139, 206, 392.  
 Breithaupt, A., 813.  
 Briggs, H. H., 156.  
 Brink, L., 302.  
 Brinkerhoff, N. M., 323, 464.  
 Britto, V. de, 811.  
 Brooks, E. H., 704.

- Brose, L. D., 302, 878.  
 Brotherus, S., 622.  
 Brown, E. J., 498, 622, 780, 879.  
 Brown, E. V. L., 66, 139, 157, 197, 390, 621.  
 Broyles, C. J., 219.  
 Brückner, A., 816.  
 Bruder, J., 300, 301.  
 Brugh, J. P. van den, 748.  
 Brunetiere, 274, 391.  
 Bruns, H. D., 747.  
 Buchanan, L., 221.  
 Buckley, W., 463.  
 Bühler, A., 813.  
 Burge, W. E., 158.  
 Burger, 274.  
 Burkhardt, C. F., 155.  
 Burkholder, C. A., 81, 301, 545, 702.  
 Burleson, J. H., 752.  
 Burrows, L., 807.  
 Busen, T., 811.  
 Bussy, 814.  
 Butler, T. H., 194.  
 Byers, W. M., 78, 621, 729, 791, 793, 813, 879.  
  
 Cabaut, J. A., 450, 622.  
 Caillaud, M., 221.  
 Calhoun, F. P., 814, 834.  
 Campbell, C. A., 560, 703.  
 Campbell, W., 622.  
 Campos, E., 701.  
 Cantonnet, A., 79, 219, 221, 541, 543, 702.  
 Caralt, 814.  
 Carhart, W. M. D., 748.  
 Carpenter, E. R., 79.  
 Carpenter, J. T., 790.  
 Carr, A. M., 139, 300.  
 Carreras, B., 220, 622, 815.  
 Carson, W. E., 623.  
 Carsten, P., 751.  
 Carter, B. R., 79, 876.  
 Cary, E. H., 133, 134, 301, 812.  
 Castelain, F., 815.  
 Castresana, B., 302, 702.  
 Castro, F. de, 608, 702.  
 Cave, C. J. P., 463.  
 Cerise, 703.  
 Chambers, R. M., 302.  
 Champlin, H. W., 299, 461, 464.  
 Chance, B., 153, 159, 318, 464, 508, 511, 623.  
 Chapman, V. A., 153, 288, 387, 620, 623.  
 Chappé, 812.  
 Charles, J. W., 816, 878.  
 Chatelin, C., 159, 191.  
 Chauffard, A., 543.  
 Chiari, 812.  
 Chotzen, 811.  
 Chudzinski, G., 813.  
 Church, B. F., 543.  
 Cilleruelo, 220.  
 Claiborne, J. H., 300, 543, 852, 853, 858, 860.  
 Clapp, C. A., 94, 300, 461.  
 Clapp, E. W., 160.  
 Clark, F. T., 785, 879.  
 Clark, H. S., 813.  
 Clark, W. L., 159.  
 Clarke, E., 219, 541.  
 Cobbledick, A. S., 461.  
 Cohen, M., 160, 302, 621, 702.  
 Colburn, J. E., 578.  
 Collette, H., 462.  
 Collins, E. T., 220, 221, 280, 574, 621.  
 Collins, G. L., 542, 814.  
 Collins, J., 464.  
 Collins, W. J., 816, 880.  
 Colombo, G. L., 541.  
 Conant, E. F., 512, 620.  
 Condat, 815.  
 Conkey, C. D., 221.  
 Conlon, F. A., 726, 812.  
 Connole, J. V., 879.  
 Connor, R., 545, 702.  
 Constantinescu, I., 879.  
 Coover, D. H., 340, 341, 343, 444, 463, 622.  
 Copeland, G. G., 702.  
 Cordero, J., 620.  
 Cords, R., 160, 703, 751, 815.  
 Coriat, 703.  
 Cosmettatos, G. F., 388, 543.  
 Coulter, R. J., 302.  
 Cousin, G., 79, 704.  
 Cowley, R. H., 620.  
 Craft, M. T., 221.  
 Crain, A. B., 816.  
 Cramer, E., 752.  
 Crawford, J. P., 219.  
 Cridland, A. B., 219, 388.  
 Crigler, L. W., 621, 812.  
 Crisp, W. H., 46, 141, 142, 144, 172, 222, 269, 340, 341, 343, 344, 362, 388, 443, 444, 446, 461, 463, 513, 514, 586.  
 Cross, A. E., 541.  
 Crossley, E. R., 66, 77, 156, 196, 388, 440, 441, 816.  
 Cruise, R. R., 154, 502, 540, 623.  
 Cuénod, A., 301.  
 Cuevas Pulido, 543.  
 Culbertson, L. R., 703.  
 Cullom, M. M., 136, 137, 300, 621.  
 Cunningham, J. F., 503, 541, 620.  
 Curdy, R. J., 621.  
 Curry, G. E., 78, 79.  
 Curtin, T. H., 702.  
 Cushing, H., 301.  
  
 Daizo, 750.  
 Dameno, E., 620, 869, 879.  
 Daniels, C. W., 220.  
 Danis, M., 194, 195, 274, 465, 542, 543, 814.  
 Dantrelle, A., 880.  
 Darier, A., 78, 275, 389.  
 Darner G. A., 155.  
 Davis, A. E., 160, 302, 792, 828, 857, 858.  
 Davis, E. M., 80.  
 Dawson, S., 703.  
 DeBoe, M. P., 704.  
 Del Miro, de Caralt, 812.  
 Del Monte, 622.  
 Demaria, E. B., 220, 367.  
 Denig, R. C. R., 464, 543.  
 Derby, G. S., 220, 880.  
 Dercum, F. X., 622.  
 Descomps, P., 620.  
 Des Voeux, H. A., 391.  
 Diaz Caneja, E., 750.  
 Dijakow, 77.  
 Dimmer, F., 78.  
 Dobson, L., 464.  
 Dodd, C., 140, 301, 351, 578.



- Doesschate, Ten, 159, 749.  
 D'Ombraïn, E. A., 750.  
 Domec, 747.  
 Dominique, C., 302.  
 Dor, L., 127, 701, 750.  
 Dorlencourt, H., 391.  
 Downey, J. E., 301.  
 Doyle, G. F., 541, 620.  
 Doyne, P. G., 541.  
 Drummond, H., 880.  
 Duane, A., 816, 852, 853, 861.  
 Dubois, 432.  
 Duhamel, A., 751, 752.  
 Dulaney, O., 136.  
 Duncan, J. W., 543.  
 Duncan, R., 715, 815.  
 Dunhill, T. P., 159.  
 Dunn, J., 299, 464, 620, 813.  
 Dunn, P., 160, 461, 540.  
 Durand, 391.  
 During, M., 749.  
 Duverger, 79, 221, 302, 703, 811, 880.  
 Dwyer, J. G., 462, 812.  
  
 Eaton, E. M., 79.  
 Edgar, T. O., 67, 435.  
 Edridge-Green, F. W., 219, 388.  
 Edwards, W. D., 814.  
 Eleonskaia, V. N., 79, 814.  
 Ellett, E. C., 157.  
 Elliot, R. H., 220, 279, 299, 301, 389, 456, 502,  
 529, 534, 541, 542, 543, 547, 615, 621, 623, 703,  
 751.  
 Ellis, A. G., 542.  
 Elschnig, A., 299, 542, 749, 750, 879.  
 Emanuel, C., 752, 815.  
 Emerson, L., 748.  
 Engelbrecht, K., 752.  
 England, E. K., 880.  
 Engler, 814.  
 Enroth, 622.  
 Enziere, 620.  
 Eppenstein, A., 747, 751.  
 Erkes, 815.  
 Espejo, L. D., 221.  
 Ewing, A. E., 158, 757.  
 Ewing, J., 880.  
 Eyer, A., 816.  
 Ezell, H., 747.  
  
 Fagin, R., 129, 816.  
 Fahmy, Abdel H., 462.  
 Faith, T., 65, 198, 200, 201, 389, 439, 443, 622,  
 749, 816.  
 Federici N., 301.  
 Fehr, 752.  
 Feingold, M., 1, 19, 87, 94, 120, 130, 132, 157,  
 220, 265, 300.  
 Fellows, C. G., 811.  
 Fergus, Freeland, 156.  
 Ferguson, J., 704.  
 Fernandez, F. M., 194, 196, 428, 463, 541, 620,  
 738, 752.  
 Fernandez Santos, J., See Santos Fernandez, J.  
 Ferree, C. E., 80, 159, 252, 390, 461, 764, 853,  
 879.  
 Ferro, P. B., 302, 704, 752.  
 Filatow, V. P., 78.  
 Findlay, E. K., 154.  
 Findlay, L., 880.  
 Finlay, C. E., 702.  
 Finnoff, W. C., 160.  
 Firket, J., 50, 80, 302, 464.  
 Fischer, 814.  
 Fisher, J. H., 78, 221, 300.  
 Fisher, L., 869.  
 Fisher, W. A., 199, 200, 201, 349, 350, 813.  
 Fleischer, B., 747.  
 Fordyce, 203.  
 Forman, J., 97, 234, 302.  
 Foster, M. H., 78, 272.  
 Foster, M. L., 72.  
 Fournier, J. C. M., 879.  
 Fox, L. W., 157.  
 Franceschetti-Spitzer, B., 815.  
 Francis, C. H., 542.  
 Frankan, 811.  
 Franke, E., 159, 543.  
 Franklin, I., 236, 388, 390.  
 Fraser, 879.  
 Fredrick, M. W., 50, 54, 128, 193, 274, 587.  
 Freeman, L., 222.  
 French, W. J., 704.  
 Frenkel, H., 543.  
 Frias, A., 542.  
 Frias y Onate, 221.  
 Fricke, 813.  
 Fridenberg, P., 390, 463.  
 Frieberg, T., 301.  
 Friedenwald, H., 9, 160, 822, 853, 859.  
 Friesen, H. J., 748, 752.  
 Friesner, F., 73.  
 Fromaget, C., 879.  
 Fromaget, H., 703, 879.  
 Fry, F. R., 462.  
 Fuchs, E., 72, 157, 158, 159, 388, 434, 541, 748,  
 749, 750, 752, 797, 813, 815, 879.  
 Fujita, S., 302.  
 Fuller, S. C., 302.  
 Fuller, T. E., 499, 620.  
  
 Gage, H. P., 190.  
 Gale, M. Jean, 106.  
 Galloway, A. R., 222.  
 Galtung, A., 816.  
 Garcia, 274, 389.  
 Garcia del Mazo, J., 79.  
 Garcia Mansilla, 543, 622, 811.  
 Gardiner, E. J., 878.  
 Garraghan, E. F., 67.  
 Garsonnin, 622.  
 Geller, K., 748.  
 Genet, L., 540.  
 Gertz, 158.  
 Gibb, H. P., 880.  
 Gibson, C. R., 301.  
 Gibson, J. L., 390, 464, 815.  
 Gibson, W. S., 220.  
 Gifford, H., 19, 83, 87, 94, 106, 115, 120, 121,  
 176, 265, 300, 542, 751.  
 Gifford, S. R., 463, 621.  
 Gillies, H. D., 543, 622.  
 Ginestous, E., 221, 302, 704.  
 Giri, D. V., 388, 462.  
 Giuseppe, T. di, 79, 220, 221.  
 Gjessing, H., 747, 749, 816.  
 Gleason, E. B., 354, 463.  
 Gleichén, A., 747.

- Goldenburg, M., 198, 438, 442, 760, 879.  
 Goldman, R., 750.  
 Goldschmidt, M., 750.  
 Goldsmith, G. H., 573, 622, 703.  
 Golovine, S. S., 301.  
 Golseth, G., 160.  
 Gonzalez, J. de J., 540, 702, 713, 815.  
 Good, R. H., 580.  
 Gordon, A., 704.  
 Göthlin, G., 390.  
 Gotti, V., 621.  
 Goudge, E., 463.  
 Gould, G. M., 541.  
 Gowers, H. L., 704, 880.  
 Gowland, A., 369, 462, 541.  
 Gradle, H. S., 154, 487, 623.  
 Graef, C., 219.  
 Gram, H. C., 815.  
 Grayson, C. P., 354.  
 Greeff, 816.  
 Green, A. S., 462.  
 Green, J. Jr., 133, 134, 135, 136, 240, 299, 300, 388, 811.  
 Green, L. D., 462.  
 Greenberg, 622.  
 Greenspon, E. A., 316, 463.  
 Greenwood, A., 151, 222, 623.  
 Grignolo, F., 541.  
 Grimsdale, H., 220.  
 Griscom, J. M., 583, 735, 878.  
 Gros, H., 540.  
 Gruenbaum, A. A., 607, 703.  
 Grüter, 811.  
 Guilleuma, J. M. S. de, 391.  
 Guiral, R., 540.  
 Gulick, L. H., 809.  
 Gullstrand, A., 747.  
 Gumbiner, A., 619.  
 Gunnufsen, 158.  
 Gutfreund, F., 750.  
 Guthrie, A. L., 300, 388.  
 Haab, O., 619.  
 Haas, H. K. de, 430, 434, 622.  
 Hacker, V., 814.  
 Haden, H. C., 312, 463, 751.  
 Hager, D. S., 153.  
 Halbertsma, 430.  
 Hall, A. J., 464.  
 Hall, W. S., 301.  
 Halle, M., 814, 815.  
 Hallez, G. L., 620.  
 Halliday, J. C., 751, 815.  
 Hamburger, C., 814.  
 Hamilton, A. S., 622, 703.  
 Hancock, J. C., 811.  
 Hansell, H. F., 80, 352, 426, 509, 511, 543, 620, 735, 787, 855, 860, 879, 880.  
 Hanssen, R., 751.  
 Haren, 814.  
 Harbridge, D. F., 417, 543.  
 Hardy, W. F., 126, 811.  
 Harkness, C. A., 751.  
 Harkness, G. F., 80.  
 Harlan, H., 732.  
 Harris, T. J., 301.  
 Harris, W., 464.  
 Harrison, W. G., 132, 301, 749, 813, 879.  
 Harrower, D., 158.  
 Harry, P. A., 220, 813.  
 Harvie, J. B., 462.  
 Harwood, C. B., 572, 703.  
 Hassin, G. B., 156.  
 Hathaway, W., 214, 620.  
 Hattink, 433.  
 Hauptman, A., 749.  
 Hawley, C. W., 199, 436, 437.  
 Heckel, E. B., 78, 300, 391, 468, 623, 855.  
 Heed, C. R., 583, 703.  
 Heitger, J. D., 702.  
 Heitmuller, G. H., 390.  
 Heller, I. M., 463.  
 Henderson, C. G., 222.  
 Henderson, T., 502.  
 Henker, O., 752, 811.  
 Henning, R., 812.  
 Henschen, S. E., 814.  
 Hensen, 814.  
 Hepburn, M. L., 221, 462, 574, 621, 702.  
 Hepburn, N. J., 809.  
 Herbert, H., 389.  
 Hering, C., 461.  
 Hermann, M. S., 816.  
 Hermann, R., 811.  
 Hernaman-Johnson, F., 815.  
 Herrenschwand, F. v., 749, 815.  
 Herrman, C., 748.  
 Herron, J. T., 300, 388.  
 Hertel, E., 302.  
 Herzig, A. J., 621.  
 Hess, C., 813, 879.  
 Hessberg, R., 815.  
 Heuser, 814.  
 Heydt, R., von der, 63, 66, 78, 157, 339, 438, 461, 576, 578, 811.  
 Higgins, C., 160, 300, 704, 752.  
 Highet, H. C., 812.  
 Hill, H. W., 880.  
 Hillegas, W. H., 300.  
 Hine, M. L., 159, 795.  
 Hinshelwood, J., 159.  
 Hippel, E. v., 702, 748, 749, 750, 752, 816.  
 Hird, R. B., 388.  
 Hirota, K., 811.  
 Hirschberg, J., 158, 812.  
 Hiwatari, K., 388, 719, 748, 812, 849.  
 Hoare, W. W., 542.  
 Hoeve, J. van der, 219, 302, 429, 431, 620, 622, 749, 750, 811.  
 Hoffman, J. R., 199, 880.  
 Hoffmann, 812, 815.  
 Hogue, G. I., 544.  
 Holden, O., 543.  
 Holden, W. A., 464.  
 Holland, E. E., 623.  
 Holloway, T. B., 158, 358, 535, 621.  
 Holmes, Bayard, 188.  
 Holmes, G., 159, 191, 270, 301, 390, 620, 622, 814.  
 Homberger, J., 689.  
 Hornicker, E., 812, 813.  
 Hötte, F. A., 751.  
 Houwer, A. W. M., 431, 432, 621.  
 Howard, H. J., 157, 158.  
 Howe, L., 156, 160, 623, 852, 853.  
 Hubbard, S. T., 300, 301, 620.  
 Hübener, 750.  
 Huber, O., 749.  
 Hudson, A. C., 220, 701.



- Hugger, C. C., 97, 234, 302, 391.  
 Hughes, H. S., 194.  
 Hughes, L. J., 201, 390, 579, 580, 703.  
 Hume, J., 812.  
 Hunt, J. R., 160.  
 Hurst, A. F., 77.  
 Hurwitz, J., 815.  
 Husain, T., 389, 813.  
 Hyman, C. H., 301.  
  
 Icard, S., 540.  
 Igersheimer, 752.  
 Illig, 816.  
 Ingram, L. C., 752.  
 Irvin, R. B., 222.  
 Irwin, F. N., 300.  
 Isaacs, S., 622.  
 Ischreyt, G., 160, 751.  
 Ishida, 389.  
 Ishihara, 390, 457.  
  
 Jackson, E., 20, 59, 60, 87, 106, 119, 141, 143,  
 144, 157, 158, 160, 210, 259, 283, 284, 285,  
 300, 339, 340, 342, 343, 344, 371, 372, 373,  
 375, 388, 392, 444, 446, 452, 453, 454, 463,  
 482, 527, 528, 513, 514, 585, 586, 609, 611,  
 614, 619, 622, 623, 702, 703, 730, 748, 752,  
 776, 794, 801, 811, 865, 879, 880.  
 Jackson, H., 159.  
 Jacobowsky, B., 703.  
 Jacobs, M., 171, 388.  
 Jahn, O., 748.  
 Jakob, 157.  
 James, R., 302.  
 Jano, 813.  
 Jansson, G., 302.  
 Jefferson, F., 157.  
 Jellett, J. W. H., 619.  
 Jelliffe, S. E., 302.  
 Jennings, J. E., 12, 158.  
 Jervey, J. W., 389.  
 Jickeli, C., 159.  
 Jobson, G. B., 814.  
 Jocqs, 77, 127, 196.  
 Johns, F. A., 543.  
 Jones, E. L., 107, 301.  
 Jones, I. H., 55, 157, 623, 869.  
 Joyce, J. H., 543.  
 Joynt, J. W., 77.  
 Juarros, C., 464, 702.  
 Juler, F. A., 879.  
 Junes, E., 813.  
 Junius, 750.  
  
 Kahn, R. H., 749.  
 Kahn, W. W., 811.  
 Kalt, M., 221.  
 Kambe, 388.  
 Kanavel, A. B., 159.  
 Kappers, C. U. A., 518, 622.  
 Kano, 389.  
 Kearney, J. A., 79, 814.  
 Keen, W. W., 542.  
 Kehrner, F., 816.  
 Keiper, G. F., 289, 390.  
 Keller, H. A., 464.  
 Kellogg, F. B., 702.  
 Kelsey, T. W., 814.  
 Kendall, H. W. M., 880.  
  
 Kershner, W. E., 168, 390, 480, 620.  
 Key, B. W., 300, 301, 302.  
 Kiilerich, 878.  
 Kiehle, F. A., 219.  
 Kiep, W. H., 220, 451, 621.  
 Kimberlin, J. W., 153.  
 Kinnier, Wilson, S. A., 623.  
 Kirchner, 541.  
 Kirk, J., 158, 220, 275, 300, 388, 390, 541, 816.  
 Kirkpatrick, H., 389.  
 Klauber, E., 750, 751, 811.  
 Kleijn, A. de, 159, 433, 701, 748, 749, 751, 811.  
 Klein, H., 814.  
 Kleinertz, 815.  
 Klinedinst, J. F., 816.  
 Klughardt, 811.  
 Knapp, A., 159, 211, 300, 301, 462, 507, 621,  
 731, 812, 814, 853, 860, 879.  
 Knapp, P., 878.  
 Knopf, S. A., 880.  
 Koeppe, L., 158, 621, 747, 749, 750.  
 Köhler, 815.  
 Köhne, W., 750, 751.  
 Kolb, O., 159.  
 Kolbe, 815.  
 Koller, C., 852.  
 Köllner, 813.  
 Komoto, 195, 389, 391, 738.  
 König, 811, 812.  
 Königstein, L., 462, 541.  
 Koster, W., 750, 751, 863.  
 Koyanagi, 360, 387, 462.  
 Krämer, R., 811.  
 Kraupa-Runk, M., 750.  
 Krauss, F., 383, 703.  
 Krauss, W., 390.  
 Krebs, A., 79, 157, 277, 299.  
 Krenger, O., 750.  
 Krivonossoff, S., 79.  
 Krückmann, 543, 544.  
 Krüger, 813.  
 Kubik, J., 157.  
 Kudrac, J., 748.  
 Kuhnt, H., 751.  
 Kumagai, N., 541, 542, 702.  
 Kummell, R., 752.  
 Kunitomo, N., 360.  
 Kunz, L., 748.  
 Kupferle, L., 814.  
 Kuznitsky, E., 749, 811.  
 Kyle, J. J., 392.  
  
 Labat, J. C., 158.  
 Laerange, F., 701, 703.  
 Lake, R., 541.  
 Lamb, H. D., 160, 220, 752, 816.  
 Lamb, R. S., 153, 159, 183, 389.  
 Lambert, W. E., 787, 879.  
 Lallemand, M., 463.  
 La Mothe, E., 154, 155.  
 La Motte, W. O., 464.  
 Lancaster, W. B., 161, 388.  
 Landolt, E., 77, 217, 461, 541, 620, 702, 811.  
 Landolt M., 219, 464.  
 Landwehr, J. H., 811.  
 Lane, F., 63, 154, 197, 201.  
 Lang, W., 53, 157, 574.  
 Langdon, H. M., 55, 157, 623.  
 Lapersonne, F. de, 54, 128, 160, 302, 387, 391.  
 Larkin, B. J., 620.

- Larsen, H., 160.  
 Lauber, H., 701.  
 Lavagna, L., 752.  
 Lawford, J. B., 574.  
 Leahy, 813.  
 Leary, T., 301.  
 Leavitt, M. J., 80.  
 Lebensohn, M. H., 750.  
 Lecha-Marzo, A., 747.  
 Leenheer, C. A., 154.  
 Leeuwen, 748.  
 Lemere, H. B., 301, 748.  
 Lemière, L., 542.  
 Lenoble, E., 701.  
 Leoz, G., 221.  
 Leoz, Ortin, 78.  
 Leplat, G., 79, 274, 391.  
 Levie, D. J. de, 159.  
 Levin, I., 621.  
 Levi-Sander, E., 752.  
 Levy, R., 342.  
 Lewis, F. P., 542, 808.  
 Libby, G. F., 58, 141, 143, 144, 158, 300, 341, 424, 443, 513, 514, 542, 586.  
 Liégard, 542.  
 Likernik, 812.  
 Lippman, H., 816.  
 Lister, A. E. J., 879.  
 Lister, W. T., 191, 502, 503, 504, 704.  
 Lloyd, H. D., 463.  
 Lloyd, J. H., 622.  
 Lloyd, R. I., 220, 387, 406, 542.  
 Lo Cascio, 543.  
 Loeb., C., 62, 148, 149, 157, 201, 220, 302, 348, 374, 397, 462, 463, 464, 542, 544, 578, 738, 748, 752, 807, 863.  
 Löffler, W., 748.  
 Lopez, C. J., 160.  
 Lortat-Jacob, 620.  
 Löwenstein, A., 157, 749, 815.  
 Luckiesh, M., 703.  
 Luminère, 814.  
 Lundsgaard, K., 78, 621, 748.  
 Lutz, A., 462, 621, 879.  
 Lyster, T. C., 878.  
 McCabe, F. J., 461.  
 MacCallan, A., 542.  
 McCassy, J. H., 703.  
 McCaw, H. J., 464.  
 McCaw, J. A., 59, 140, 141, 158, 266, 300, 341, 343, 443, 620.  
 McClelland, E. S., 388, 748.  
 McCurry, W. T., 134.  
 McDaniel, F. L., 300.  
 McFarling, A. C., 464.  
 McHenry, J. H., 621.  
 McKee, S. H., 816, 848.  
 McKellar, J. H., 567, 701.  
 McKendree, C. A., 463.  
 McKeown, E. E., 341, 514, 515, 622, 623.  
 McMillan, A. L., 159.  
 Macphail, J. N., 811.  
 McReynolds, J. O., 131, 302.  
 MacWhinnie, A. M., 219, 299.  
 Macht, D. I., 622.  
 Mack, C., 301.  
 Maddox, E. E., 52, 159, 219, 526, 619.  
 Magalhaes, A., 159.  
 Maggiore, L., 543.  
 Magitot, A., 157, 158, 462, 542, 587, 702, 703.  
 Magnusson, H., 750.  
 Magro, 300.  
 Magruder, A. C., 152, 300.  
 Malling, B., 301, 362, 390, 463, 542.  
 Manes, A. J., 542.  
 Mann, R. H. T., 135, 300, 462.  
 Mann, W. A., 438, 578.  
 Mansilla, S. G., 389.  
 Marbaix, 542, 702.  
 Marbourg, E. M., 158, 514, 515, 584, 623.  
 Marconi, A., 620.  
 Marie, P., 159, 191.  
 Marin, M., 77, 221, 450.  
 Marin Amat, M., 221, 388, 463, 622, 749, 813.  
 Markel, J. C., 79, 300, 389.  
 Marklund, G., 620.  
 Marks, L. B., 544.  
 Marquez, D. M., 702, 704, 812.  
 Marshall, C. D., 813.  
 Martin, A., 567, 702.  
 Martin, H. H., 131, 132, 134, 137, 301, 542.  
 Martin, L., 79.  
 Martinez, 221.  
 Mas, F., 221, 300.  
 Mason, A. B., 541.  
 Mason, A. H., 129, 299.  
 Masuda, T., 55, 157, 299, 387, 390, 391.  
 Mathers, R. E., 153.  
 Matsun, W. F., 142, 343, 344, 512, 586, 702.  
 Matsuoka, 389, 390.  
 Maucione, L., 387, 543.  
 Maxey, E. E., 13, 157.  
 Maxwell, E. M., 220, 451, 621, 704, 816.  
 Mav, C. H., 54, 55, 128, 194, 195, 273, 276, 370, 451, 526, 608, 687, 796, 812.  
 Mayer, 813, 815.  
 Maynard, F. P., 158.  
 Mayou, M. S., 220, 221, 504, 574, 701, 814.  
 Mazzei, A., 702.  
 Meader, C. N., 119.  
 Meirelles, E., 542.  
 Meisner, W., 751.  
 Melland, C. H., 543.  
 Meller, J., 749, 751, 752, 813.  
 Menacho, M., 79, 221, 541.  
 Merida, N., 543.  
 Merigot, de T., 748.  
 Merle, P., 620.  
 Merriam, L. A., 77.  
 Metz, R. B., 79, 219.  
 Meyer, H., 814.  
 Meyer-Steing, T., 158.  
 Milian, 540.  
 Miller, A. H., 160.  
 Miller, C. S., 159.  
 Miller, G. V., 79.  
 Mine, 388.  
 Minne, van der, A., 619.  
 Minturn, R., 299.  
 Mlady, 78.  
 Mohr, M., 157.  
 Mok, 816.  
 Moleen, G. A., 191, 192.  
 Monaghan, D. G., 344.  
 Monaumi, C., 78.  
 Monbrun, A., 78.  
 Moncrieff, W. E. S., 865.  
 Monnet, P., 543.  
 Monson, S. H., 80, 464.



- Montañó, E.-F., 220, 541.  
 Monte, del A., 79.  
 Moore, R. F., 880.  
 Moore, R. W., 388.  
 Moore, T. W., 160.  
 Moran, T. J., 620.  
 Morax, V., 220, 300, 541, 542, 607, 702, 736,  
     752, 812, 813, 879.  
 Moreau, F., 814.  
 Moret, 195, 221, 302, 392, 816.  
 Morgano, P., 78.  
 Moron, Riuz, J., 78.  
 Morrie, G., 78.  
 Morrison, F. A., 338, 464, 571, 702, 727, 815.  
 Mosso, G., 542.  
 Motais, F., 880.  
 Mottram, J. C., 388.  
 Mougeot, A., 302.  
 Moulton, H., 158.  
 Moxon, F. H., 619.  
 Mulcahy, T. A., 757, 813, 880.  
 Müller, 703.  
 Mulock-Houwer, 621, 879.  
 Muncaster, S. B., 540.  
 Mundt, G. H., 347.  
 Murdock, J. F., 277, 388, 391.  
 Muro, 541.  
 Murray, A. N., 436, 581.  
 Murray, W. R., 748.  
 Mussio-Fournier, J. C., 751.  
 Musy, T., 541.  
 Mutschenbacher, T. von, 159.  
 Myashita, 389.  
 Nakamura, 387, 389, 390.  
 Nance, W. O., 346, 434, 436, 437, 441, 622, 623,  
     816.  
 Navarrete, 221.  
 Naville, F., 621.  
 Neal, H. V., 702.  
 Neeper, E. R., 77, 78, 141, 143, 512, 513, 585.  
 Netter, A., 543.  
 Netto, O. C., 493, 620.  
 Newman, E. A. R., 158.  
 Newton, L. A., 543, 623.  
 Nicolai, 430, 749.  
 Nishimura, M., 302.  
 Nixon, C. E., 622, 703.  
 Nogawa, 389.  
 Noguchi, H., 702.  
 Nonne, 439.  
 Nordentoft, S., 880.  
 Norris, C., 543.  
 Norris, S. C., 809.  
 Norton, A. B., 158.  
 Nutting, P. G., 388.  
 Ochi, 388, 391.  
 Ochoterena, I., 80, 879, 880.  
 Ochsenius, 812.  
 O'Connor, R., 806, 878.  
 Odeneal, T. H., 220.  
 Odier, 463.  
 Odriozola, E., 880.  
 Oehlecker, F., 159.  
 Oepen, v., 814.  
 Ogata, 750.  
 Oguchi, 390.  
 Ohm, J., 748.  
 Oloff, H., 751, 816.  
 Olsho, S. L., 205, 389.  
 Onfray, 543.  
 Onishi, 388.  
 Opin, 221.  
 Oppenheimer, 816.  
 Orendorff, O., 114, 120, 266, 302, 585.  
 Ormond, A. W., 280, 301, 390, 463.  
 Osborne, E. S., 220.  
 Otchapovski, S. V., 80.  
 Ovio, 541.  
 Pacheco Luna, R., 122, 159, 302, 543, 702, 749,  
     751, 805, 880.  
 Paganelli, T. R., 812.  
 Pagenstecher, A. H., 619, 814.  
 Paine, H. S., 177, 389.  
 Palomar, 543.  
 Paparcone, E., 541.  
 Pardo, R., 463, 814.  
 Parenteau, 542.  
 Parker, F. C., 203, 391.  
 Parker, J. P., 148.  
 Parker, W. R., 151, 159, 219, 495, 621, 750.  
 Parsons, H., 280.  
 Parsons, R. P., 388.  
 Pascheff, 157.  
 Paton, L., 301, 574, 622, 703.  
 Patterson, J. A., 59, 60, 78, 157, 446, 584, 585,  
     586.  
 Paul, 812.  
 Payne, S. M., 854, 860, 861.  
 Payson, E. B., 301.  
 Pearson, A., 222.  
 Peck, W. H., 220.  
 Penichet, J. M., 195, 388, 541.  
 Perdrau, J. R., 464.  
 Pereyra, G., 702.  
 Perez Bufil, 78, 542, 621, 703, 813.  
 Perez, Jimenez, 220.  
 Peter, L. C., 189, 387, 458, 732, 733, 734, 879.  
 Petersen, 543.  
 Peterson, J., 221.  
 Pfingst, A. O., 131, 302, 703.  
 Pflügk, v., 80, 811, 813.  
 Pichler, A., 747, 748, 751, 752, 812, 813, 815.  
 Pickler, 812.  
 Pierson, P. H., 221, 543.  
 Piesbergen, 749.  
 Pifer, J. D., 620.  
 Pikler, J., 748.  
 Pischel, K., 702.  
 Pissarello, C., 542.  
 Place, E. C., 390.  
 Plocher, R., 750.  
 Pockley, G. A., 302, 748, 749, 816.  
 Pol, J. H., 160.  
 Polack, A., 814.  
 Pollnow, 157.  
 Pollock, W. B. I., 221.  
 Polyak, L., 814.  
 Pontius, P. J., 80, 145, 302.  
 Poppelreuter, W., 159.  
 Posey, W. C., 79, 88, 145, 201, 202, 204, 205,  
     221, 282, 300, 301, 302, 355, 356, 359, 360,  
     389, 390, 391, 393, 447, 448, 449, 462, 463,  
     464, 505, 507, 511, 541, 582, 583, 623, 703,  
     803, 851, 852, 857, 858, 880.  
 Post, M. H., 77.  
 Pözl, O., 814.  
 Poulard, A., 160, 220, 221, 543, 621, 702, 863.

- Poyales, F., 80.  
 Poyet, G., 463.  
 Pratt, J. A., 157.  
 Prelat, 220.  
 Prezzolini, M., 159.  
 Price, G. E., 622.  
 Price, G. H., 131.  
 Price, G. W., 129.  
 Prince, A. E., 813.  
 Pritchard, E., 464.  
 Puckner, W. A., 536, 619.  
 Purtscher, 815.  
 Pusey, B., 703.  
 Pusey, W. A., 749.  
 Pyle, W. L., 730, 748, 852.  
 Radcliffe, M., 359, 389.  
 Raeder, G., 813, 816.  
 Rahmenführer, E., 751.  
 Ramirez, E., 159.  
 Ramsay, A. M., 879.  
 Rand, C. W., 79.  
 Rand, G., 159, 252, 390, 461, 764, 879.  
 Rasquin, E., 274, 388, 390, 540, 619, 751.  
 Ravenswaaij, A. van, 389, 542.  
 Ray, V., 541, 707.  
 Real, 543, 863.  
 Rechsteiner, 812.  
 Reeve, R. A., 856, 858.  
 Reilingh, 430.  
 Reitsch, 813.  
 Rémy, 541.  
 Renninger, A. R., 300.  
 Rezende, C. de, 748.  
 Rheinberg, J., 301.  
 Ribas Valero, 812.  
 Ribstein, W., 813.  
 Rice, J. F., 879.  
 Richard, P., 540, 752.  
 Richardson, B., 878.  
 Rietz, E., 815.  
 Ring, G. O., 57, 160, 324, 464, 506, 619, 704, 734, 790, 880.  
 Ringle, C. A., 120, 266, 343.  
 Risley, S. D., 28, 160, 199, 204, 216, 281, 289, 357, 389, 392, 539, 792, 856, 862.  
 Roberts, E. R., 301.  
 Roberts, G. F., 390.  
 Robertson, C. M., 154, 816, 878.  
 Robertson, E. N., 266.  
 Robinson, J. M., 158, 245, 390.  
 Robinson, J. R., 78, 79.  
 Rocha, N. da, 463.  
 RoCHAT, G. F., 390, 430, 432, 433, 620, 621, 703.  
 Roche, C., 78, 192, 389, 463.  
 Rochester, A. S., 154, 155.  
 Rochon-Duvigneaud, A., 158, 748.  
 Roedelius, 812.  
 Roelofs, C. O., 77, 430, 622, 751, 811.  
 Rohr, M. von, 752, 811.  
 Rönne, H., 78, 157, 158, 540.  
 Röper, 813.  
 Rosenstein, A. M., 812.  
 Roth, A. W., 157.  
 Rothschild, L., 749, 812.  
 Rouquier, 815.  
 Roure, 542.  
 Rovinsky, A., 80.  
 Rowland, J. F., 134.  
 Roxburgh, A., 574, 620, 702.  
 Roy, D., 130, 158, 160, 302, 464.  
 Ruiz, J. M., 301, 542.  
 Rumsey, C. L., 392.  
 Ruttin, 814.  
 Sachs, O., 812.  
 Sachse, 815.  
 Saint-Martin, 79, 815.  
 Sakai, 388, 389.  
 Sakamoto, 387.  
 Salterain, J. de, 391.  
 Salus, R., 751, 812.  
 Salzer, 811.  
 Salzmann, M., 157, 701.  
 Sammartino, G., 620.  
 Samperi, G., 388.  
 Santonoceto, O., 751.  
 Santos Fernandez, J., 78, 156, 274, 300, 387, 388, 389, 392, 462, 544, 562, 621, 702, 738, 813, 878, 880.  
 Satake, 391.  
 Sato, 389.  
 Sattler, R., 160.  
 Saunte, 749.  
 Sautter, A. C., 219, 273, 509, 621.  
 Savage, G. C., 149, 302.  
 Scalinci, N., 750.  
 Schanz, F., 702, 748, 811.  
 Scheube, 158.  
 Schevensteen, A. van, 78, 221, 301, 752, 813.  
 Schieck, 814.  
 Schiötz, I., 463.  
 Schleisner, F. S., 880.  
 Schmidt, H., 750.  
 Schmitt, L., 815.  
 Schneideman, F. M., 392.  
 Schoch, L. E., 302.  
 Schoeler, F., 750.  
 Schoute, 429, 430.  
 Schrant, J. H., 156.  
 Schröder, G. E., 621.  
 Schröder, F., 751.  
 Schultz, H. I., 541.  
 Schürmann, R., 813, 816.  
 Schwachtgen, G. R., 153.  
 Schwarz, 811.  
 Schweinitz, G. E. de, 78, 151, 157, 160, 220, 510, 816, 817.  
 Schwenk, P. N. K., 55, 78, 144, 159, 301, 358, 359, 389, 393, 462, 504, 541, 621, 851, 854, 880.  
 Scott, T. B., 543.  
 Scruton, W. A., 812.  
 Sedwick, W. A., 265, 266, 750.  
 Segar, L. H., 388.  
 Seidel, E., 701, 748, 750.  
 Seto, 195, 389.  
 Sewall, H., 104.  
 Sgross, S., 541.  
 Shafer, J. J., 301.  
 Shaffner, P. F., 301.  
 Shahan, W. E., 54, 78, 135, 157.  
 Shanker, H., 158.  
 Shannon, C. E. G., 157.  
 Shannon, J. R., 159.  
 Shastid, T. H., 43, 157, 222, 290, 378, 388, 464.  
 Shaw, W. R., 622.  
 Sheperd, C., 751.  
 Shewell, H. W. B., 813.  
 Shioishi, 391, 392.  
 Shoemaker, L. A., 749.



- Shoemaker, W. A., 789.  
 Shumway, E. A., 404, 506, 507, 541, 620, 788.  
 Sicard, 543.  
 Siegrist, 541.  
 Silex, 704, 816.  
 Simpson, J. H., 157.  
 Sinclair, W. W., 503.  
 Siredey, M. A., 79.  
 Sloan, E. P., 751.  
 Slocum, G., 703.  
 Small, C. P., 155.  
 Smith, C. L., 156.  
 Smith, D., 815.  
 Smith, E. D., 747.  
 Smith, E. T., 748.  
 Smith, H. A., 116, 302.  
 Smith, J., 573, 702.  
 Smith, J. J., 623, 704.  
 Smith, J. R., 80, 462, 573, 702.  
 Smith, P., 462, 814.  
 Smith, S. F., 222.  
 Smith, S. M., 352, 464.  
 Snell, A. C., 623.  
 Snellen, 432, 811.  
 Solarès, 878.  
 Sollman, T., 286, 619, 621.  
 Souques, 463.  
 Souter, W. C., 154.  
 Speciale-Cirincione, 46, 157.  
 Spencer, F. R., 59, 60, 61, 62, 100, 107, 120, 142, 158, 265, 302, 343, 445, 462, 464, 512, 513, 514.  
 Speyer, 540.  
 Spiece, W. K., 750.  
 Spitze, E. C., 80, 157.  
 Spurway, J., 389.  
 Srinivasachary, E. V., 879.  
 Stähli, J., 153, 749.  
 Stanculeanu, G., 80.  
 Stanton, E. M., 751.  
 Stapleton, E. A., 159.  
 Stargardt, K., 157, 811, 814.  
 Stark, H. H., 20, 91, 94, 120, 266, 300.  
 Stebbing, G. F., 464.  
 Steiger, A., 541, 738, 748, 878.  
 Steim, J. M., 301.  
 Stein, O. J., 542.  
 Steinbugler, W. F. C., 300, 814.  
 Steinitzer, 621.  
 Stenvers, H. W., 701, 747.  
 Stephenson, Sydney, 78, 704.  
 Sternberg, A., 748.  
 Stevens, G. T., 703.  
 Stevenson, W. D., 78.  
 Stieglitz, 536, 619.  
 Stieren, E., 277, 278, 300, 391.  
 Stilwill, H. R., 141, 301, 341, 446, 462, 513, 514, 515, 621.  
 Stitzel, J. W., 391.  
 Stock, W., 750, 751.  
 Stocker, 540.  
 Story, J. B., 222.  
 Strader, G. L., 153.  
 Strasburger, J., 816.  
 Straub, M., 541.  
 Strebel, 622.  
 Stricker, L., 816.  
 Strickler, D. A., 143, 300, 344, 514, 584, 621, 623, 703.  
 Strübing, H., 814.  
 Struycken, H. J. L., 79, 159, 462.  
 Stucky, J. A., 133.  
 Stuelp, 816.  
 Stumpf-Pleikart, 815.  
 Sturm, S. A., 277, 388, 390.  
 Suffa, G. A., 541.  
 Sukanuma, 390, 737, 879.  
 Suker, G. F., 154.  
 Sulzer, 812.  
 Sutphen, T. Y., 790.  
 Swan, C. A., 541.  
 Swan, C. J., 154.  
 Sweet, W. M., 517, 622, 735, 830, 858, 880.  
 Swindle, P. F., 221.  
 Sym, W. G., 704.  
 Symmers, D., 301.  
 Symms, J. L. M., 390.  
 Szily, A. v., 159, 704, 748, 814.  
 Taft, A. E., 390.  
 Takayasu, 388.  
 Takita, C., 302.  
 Talbot, F. B., 621.  
 Talmey, M., 542, 621.  
 Tarun, W., 157, 791, 855.  
 Tartois, 880.  
 Taylor, H. H., 302.  
 Taylor, James, 620.  
 Taylor, S. J., 220, 463.  
 Teal, F. T., 185, 392.  
 Tendlau, A., 751.  
 Tenner, A. S., 620, 879.  
 Terrien, F., 77, 79, 80, 461, 462, 704, 747, 879.  
 Terson, A., 77, 221, 362, 461, 541, 880.  
 Teulières, M., 80, 160, 464.  
 Theobald, S., 157, 847, 860.  
 Thewlis, M. W., 80.  
 Thompson, A. H., 388, 462.  
 Thompson, G., 502, 621.  
 Thompson, H. M., 338, 340, 342, 344, 463.  
 Thompson W. R., 814, 879.  
 Thomsen, H., 750.  
 Thomson, E., 220.  
 Thornburg, H. D., 813.  
 Tillot, E., 541, 543, 544, 796, 879.  
 Tillyer, E. D., 541.  
 Tilney, F., 703.  
 Timberman, A. J., 750.  
 Todd, F. C., 154, 537, 697.  
 Toledo, R. A. de, 391.  
 Tompkins, H. H., 880.  
 Tooke, F., 224, 391, 730, 879.  
 Tooker, C. W., 158, 159, 160.  
 Török, E., 158.  
 Torres Estrada, A., 703.  
 Toussant, 387.  
 Trantas, A., 619, 878.  
 Trapezontzeva, E., 78.  
 Traquair, H. M., 80.  
 Trevor, R. S., 302.  
 Tribble, G. B., 160.  
 Tristaino, B., 389.  
 Tuchler, A. S., 157.  
 Tuckett, I. L., 220, 221, 543.  
 Turner, H. H., 812.  
 Turner, J. B., 505, 620.  
 Twietmeyer, 82.  
 Tydings, O., 67, 139, 349, 352, 437, 441.  
 Tyrell, F. A. C., 220, 221, 504, 573, 621, 702.  
 Tyson, H. H., 159, 300, 620, 731, 831, 854, 860.  
 Tzytowski, M. L., 78.

- Uchermann, A., 880.  
 Uddgren, G., 811.  
 Uhlenhuth, E., 622.  
 Uhthoff, W., 749, 816.  
 Umeda, K., 702.  
 Unger, H., 752.  
 Urayama, 391.  
 Uribe-Troncoso, M., 157, 207, 222, 273, 365, 367,  
 370, 392, 451, 608, 621, 688, 737, 799, 813, 816,  
 878.  
 Urra, F. M., 78.  
 Urraca, C., 814.  
  
 Vacher, 704.  
 Vagliasindi, 702, 878.  
 Vail, D. T., 576, 580, 581.  
 Valby, 341.  
 Vallon, M., 623.  
 Valude, E., 704.  
 Vandergrift, G. W., 302.  
 Velez, D. M., 543.  
 Velter, E., 463.  
 Verheyden, F., 392.  
 Verhoeff, F. H., 706, 730, 732, 794, 812, 879,  
 880.  
 Viets, H., 462.  
 Viner, G., 703.  
 Vogt, A. C., 79, 387, 390, 540, 542, 704, 747, 750.  
 Von der Heydt, R., 63, 66, 78, 157, 339, 438,  
 461, 576, 578, 811.  
 Vreeland, F. D., 435, 437.  
  
 Waardenburg, P. J., 433, 751.  
 Wachtler, G., 752.  
 Wada, 390.  
 Wagner, L. H., 267, 389.  
 Wakisaka, 388.  
 Waldmann, B., 812.  
 Walker, C. B., 77, 156, 301.  
 Walker, C. E., 61, 142, 341, 342, 343, 344, 443,  
 444, 445, 446, 620.  
 Walker, H., 154.  
 Wallace, F. E., 143, 144, 301.  
 Wallace, W., 541.  
 Ward, H. B., 703.  
 Warthin, A. S., 816.  
 Watanabe, 388.  
 Weaver, T. W., 379, 462.  
 Wechsler, I. S., 704.  
 Weekers, L., 50, 80, 194, 302, 464, 879.  
 Weeks, J. E., 158, 463, 731, 753, 789, 792, 795,  
 812, 880.  
 Weidler, W. B., 722, 729, 815.  
 Weigelin, S., 751, 879.  
 Weiss, 749.  
 Weller, C. V., 816.  
 Wells, D. W., 20, 157, 156, 456, 496, 616, 620,  
 701, 727, 812.  
 Wernicke, O., 365, 463.  
 Wescott, C. D., 156.  
 Wessely, 811, 813, 815, 816.  
 Westfall, L. M., 220.  
 Westphal, 813, 814.  
 Weve, H., 431, 433, 434, 462, 621.  
 Weymouth, F. W., 750.  
  
 Wharton, J., 503, 541, 620.  
 Wheeler, J. M., 194, 620, 812, 878.  
 Wherry, W. B., 541, 702.  
 Whitaker, E., 815.  
 White, J. W., 621, 811.  
 Wible, E. E., 79, 277, 391.  
 Wieden, E., 623.  
 Wieden J., 79.  
 Wiener, A., 462.  
 Wilde, W. R. W., 222.  
 Wilder, W. H., 154, 302, 623, 791, 853, 856.  
 Willetts, E. W., 391.  
 Williams, C. E., 157.  
 Williams, E. R., 861.  
 Wilmer, W. H., 811, 851.  
 Wilson, J. A., 299, 388, 542.  
 Wilson, L. B., 815.  
 Winkler, C., 463.  
 Wipper, O., 427, 542.  
 Wirtz, R., 749.  
 Witmer, J., 748.  
 Wohde-Twistinger, B., 157, 813.  
 Wolfe, C. T., 299.  
 Wolfe, O. R., 78.  
 Wolff, 812.  
 Wolffberg, 77, 540, 811.  
 Woll, F. A., 461.  
 Wood, C. A., 154, 455, 739, 868, 880.  
 Wood, C. G. R., 158.  
 Wood, H., 156.  
 Woodruff, H. W., 576, 579, 702.  
 Woodruff, T. A., 154, 347.  
 Woods, A. C., 126, 157, 300, 853.  
 Woods, H., 541, 790, 792, 859.  
 Woodworth, C. W., 701.  
 Woodyatt, R. F., 752.  
 Wootton, H. W., 301.  
 Worth, C., 219.  
 Worthington, M., 67.  
 Wright, C. D. A., 391, 464.  
 Würdemann, H. V., 209, 392, 738, 740, 752, 869,  
 865, 870, 871, 880.  
 Wyler, J. S., 78, 127, 128, 196, 231, 274, 275, 290,  
 370, 389, 391, 450, 607, 687, 783, 796, 865, 878.  
  
 Yakovlewa, A. A., 79.  
 Yealland, L. R., 575, 623.  
 Youdine, 80, 464.  
 Young, Geo., 128, 542, 621, 622, 703.  
 Young, H. B., 458, 620.  
 Young, W. R., 751.  
 Yudkin, A. M., 303, 464.  
  
 Zade, M., 703.  
 Zarzycki, P., 221, 463, 878, 880.  
 Zeemann, W. P. C., 368, 430, 463, 622, 751.  
 Zentmayer, W., 79, 145, 203, 204, 205, 247, 281,  
 300, 302, 354, 359, 389, 392, 449, 450, 462, 464,  
 508, 511, 515, 570, 583, 621, 701, 733, 735,  
 791, 855, 862, 879.  
 Ziegler, S. L., 353, 354, 464, 507, 509, 583, 729,  
 794.  
 Zimmermann, C., 473, 620, 702.  
 Zwaluwenburg, J. G., 623.



# SUBJECT INDEX

A number in heavy face type gives the page of an original article, including translations, editorials and correspondence. Numbers in brackets refer to abstracts, including those given in society proceedings. Other numbers indicate incidental mention of a subject, as in the titles given in Ophthalmic Literature. The index for the Digest of the Literature is separate from this and will be found at the end of the book. Names are indexed separately.

- Abbreviations for ophthalmic journals, 623.
- Abducens paralysis, [277], 300, 388.
- Aberration, 541.
- Abnormalities of eye, 158.
- Abscess of
  - caruncle, [344], 463.
  - cerebrum, 156.
  - cornea, 340.
  - lids, 391.
  - orbit, 159, 543.
  - sclera, 541.
- Absorption
  - of cornea, 702.
  - of senile cataract, 83, 300, 702, 750.
- Abstracts, 46, 122, 191, 267, 360, 450, 518, 587, 685, 736.
- Accessory sinus disease, 324, 390, 464, 705.
- Accidents of occupation, 158, 160, 213, 464, 704.
- Accommodation, 77, 156, 620, 701, 811.
  - fatigue of, 156.
  - in aphakia, 570.
  - painful, 240, 388.
  - paralysis of, 388.
- Achromatopsia, 365, 463.
- Acids, 302.
  - picric, 541.
- Acne rosacea, 157.
- Acromegaly, 221.
- Acuteness of vision, 71, [77], 156, 288, 387, [430], 461, 540, 554, 619, 701, 752, 811, 878.
- Adaptation, 750, 813.
- Adaptometer, 811.
- Adenoma, [360], 391, 464.
- Adjustment, inertia of, 764, 853.
- Adrenalin, 283, 302, 540, 606.
- Advancement, 157, 161, 219, 388, 428, 462, 541.
- Advertising, 70.
- Age, 80, 302, 389.
  - and color spectra, 79, 301.
  - and refraction, 461.
- Albumin in aqueous, 542.
- Albuminuric retinitis, 301, 702.
- Alcohol, 158, 553, 813.
  - in blepharospasm, 543.
- Alexia, 79, 390.
- Amaurosis, see Blindness.
- Amaurotic family idiocy, 79, 158, 462, 621, 814.
- Amblyopia ex anopsia, 388, 464.
  - hysteric, 338.
  - see also Toxic Amblyopias.
- Amblyoscope, 66.
- Ambulance, 538.
- American Journal of Ophthalmology, 68, 146, 160, 222, 302, 375, 454, 623, 866.
- American Ophthalmological Society, trans-
  - actions of, 151, 215, 453, 623, 729, 805, 551.
- Ametropia, 541.
- Ammonia, 302.
- Anales de Oftalmologia, 207.
- Anamnesis and eye disease, 540.
- Anaphylaxis, 78, 80, 704.
- Anatomy of lacrimal apparatus, 703.
  - of orbit, 391.
- Anesthetics, accidents from, 286, 392.
  - intraspinal, 620.
  - local, [517], 619, 621, 622, 701, 811.
- Aneurysm of carotid, 159.
- of retinal artery, 12, 158.
- Angiomatosis and glioma, 751.
- Angioid streaks in retina, [583], 703, 750.
- Angioma, 159, 350, 463, 815.
- Angiosclerosis, [584], 703.
- Anguloscope, 382.
- Anidria, 158, 389.
- Aniscoria, 157, 688, 879.
- Anisometropia, 811.
- Ankyloblepharon, 159.
- Annals of Ophthalmology, 148.
- Anomalies of
  - cornea, 78.
  - lens, 391, 464.
  - lids, 849.
  - motor apparatus, 861.
  - ocular fundus, 221, 848.
  - optic nerve, 622, 797.
  - pupil, 751.
  - retina, 463, 750, 797.
  - uveal tract, 157, 749.
  - vitreous, 158.
- Anterior chamber, 46, 78, 157, 220, 389, 462, 621, 702, 749, 813, 879.
  - depth of, 813.
  - development of, [46], 157.
  - injury to, 221, [445], 623, 752.
  - irrigation of, [512].
  - ophthalmoscopy of, 701.
- Anthrax, 301.
- Antigens of uveal tract, [126], 300.
- Antipyretics, 622.
- Antityphoid vaccine, [54], 160, 220.
- Antrum disease of, 300.
  - tumor of, 145.
- Aphakia, 701.
  - and accommodation, 570.
- Aphasia, 463, 622.
- Apthae epizootica, 816.
- Aqueous humor, 157, 542, 599.
- Arcus senilis, 78.
- Argyll-Robertson pupil, 462, 542, 813.
- Argyrosis, 812.

- Army and Navy, eyes of, 623, 701, 703.  
 Arsacetin, 160.  
 Arsenic, [434], 621.  
 Arsenobenzol, 387, 543.  
 Arterial pressure and retinal artery, 158, 300, 813.  
 Arteriosclerosis, [59], 158, 813.  
 Artificial eye, 79, 159, 542, 543, 803.  
   explosion of, 79.  
   light, 189, 387.  
 Asphyxiation, 160.  
 Associated movements of lid and jaw, 79, 391, 473, 687.  
 Asthenopia, [677], 748, [861].  
 Astigmatism, 77, 80, 156, 462, 541, 701, 811, [860].  
 Atmospheric pressure, 78.  
 Atrophy of choroid, 300.  
   of iris, 1, 157, 336, 462, [510], 621.  
   of optic nerve, [61], [141], 158, 168, 221, [227], 390, 463, 542, [791], 813, 879.  
   of retina, 300, 387, 390, 750.  
 Atropin, 220, 300, 667.  
   in cataract operation, 542.  
 Aural disease, 352, 464.  
 Autointoxication, 462.  
 Autoplasty, 543.  
 Autopsy, 425.  
 Aviation, 76, 157, 388, 390, 392, 464, 541, 620, 623, 811, 816, 851, 878.  
 Avulsion of eyeball, 9, 160, 543, 752.  
   of optic nerve, 787.  
  
 Bacillus subtilis isolated from eye, 317, 463.  
 Bacteria, 482, 541, [674].  
 Bacteriologic diagnosis, 80.  
 Bárány test, [55], 157, 388, 541, 620, 623.  
 Barraquer's operation, 79.  
 Basedow's disease, 811.  
 Bifocal glasses, [575], 701.  
   for myopes, 701.  
 Binocular vision, 748, 812, 878.  
   test of, 219, 702.  
 Binoculars and St. Jerome, 623.  
 Biographic sketches, 290, 379, 381, 694, 807.  
 Biology and the eye, 221.  
 Birth injuries, 9, 160, 543.  
 Bissell (and Haitz) charts, 20.  
 Bjerrum's method, 747.  
 Bleennorrhoea, 78, 812.  
 Blepharitis, 301, 543.  
 Blepharoplasty, [503], 622, 880.  
 Blepharoptosis, 622.  
 Blepharospasm, 221, 338, 463, 543, 815.  
 Blepsopathia, 391.  
 Blind, the, 76, 79, 80, 153, 160, 222.  
   care of, 160, 302, 544, 623, 704, 816.  
   employment of, 222, 700, 880.  
   guides for, 583.  
   institutions for, 153, 374, 464, 544, 816, 880.  
   literature for, 160.  
   re-education of, 76, 222, 392, 544, 816, 880.  
   school for, 816.  
 Blindness, 79, 80, 160, [507], 816, 879.  
   after convulsions, 464.  
   from intestinal hemorrhage, 158.  
   hysterical, [274].  
   impending, 544.  
   monocular, 159, 487.  
   transitory, 814.  
  
 Blind spot, 747.  
 Blood circulation in glaucoma, 813.  
   count, 621.  
   cyst, 625.  
   pressure, 289, 373, 390, 462, 750, 813.  
   test, 816.  
 Blue cataract, 360, 535, 749.  
   sclera, 389, [431], 620, 726.  
 Bone prosthesis, 159.  
 Bon-Opto, 154.  
 Book notices.  
   Allport, F., State Legislation Concerning the Eye, 376.  
   American Encyclopedia and Dictionary of Ophthalmology, Casey A. Wood, Editor, 455, 868.  
   Anatomical Names, Eycleshymer, A. C., Schoemaker, D. M., Moodie, R. L., 287.  
   Annual Report of the Surgeon General of Public Health Service, 1916, 73.  
   Barrett, J. W., The Twin Ideals, 870.  
   Berry, G., and Bradshaw, T. P., Eye Hazards in Industrial Occupations, 213.  
   Braun, Alfred, and Friesner, I., The Labyrinth, 73.  
   Elliot, R. H., The Indian Operation of Couching for Cataract, 741.  
   Elliot, R. H., Glaucoma, A Textbook for the Student of Ophthalmology, 456, 529.  
   Foster, M. L., Diagnosis from Ocular Symptoms, 72.  
   Fuchs, E., Textbook of Ophthalmology, 72.  
   Greenwood, A., de Schweinitz, G. E., and Parker, W. R., Military Ophthalmic Surgery, 151.  
   Hathaway, W., Saving Sight and Civic Duty, 214.  
   International Clinics, R. H. M. Landis, Editor, 693.  
   Ishihara, S., Tests for Color Blindness, 376, 456.  
   Jones, I. H., and Fisher, L., Equilibrium and Vertigo, 869.  
   Knapp, A., Medical Ophthalmology, 211.  
   Lagrange, F., "Les Fractures de l'Orbite par Projectiles de Guerre," 742.  
   Lagrange, F., "Atlas d'Ophthalmoscopic de Guerre," 611.  
   MacKenzie, W. C., Action of Muscles, 692.  
   Manual of Ophthalmology, Surgeon General's Office, 214.  
   Neurological Clinics, Collins, J., Editor, 693.  
   Nistagmo Ocular, Dameno, E., 870.  
   Sheard, C., Dynamic Ocular Tests, 377.  
   Sluder, G., Headaches and Eye Disorders of Nasal Origin, 743.  
   Transactions, Ophthalmological Society of the United Kingdom, v. 37, 215.  
   Ward, H. B., The Animal Parasites of the Human Eye, 614.  
   Wells, D. W., The Stereoscope in Ophthalmology, 456.  
 Botulism, 464, 543.  
 Bradycardia, 302.  
 Brain injury, 751.  
   lesions, 390, 702.  
   tumor, 79, 159, 221.  
 Brightness, perception of, 368.



- Buphthalmos, 158, 220, [683], [732], 879.  
 Burns, of cornea, 464, 703, 749.  
 Cadets, visual acuity of, 461.  
 Calcium chlorid, [193], [676], 749.  
     in glaucoma, [193].  
 Camp Jackson, examination of drafted, 318.  
     Sherman, conjunctivitis at, 480.  
 Camphor, 813.  
 Campimetry, see Perimetry.  
 Candiolin, 77.  
 Canthoplasty, 231, 391, 727, 815.  
 Canthotomy, 879.  
 Carbon dioxid snow, 750.  
 Carcinoma, 815.  
     of choroid, 391, 752.  
 Cardiopathy, 301.  
 Carotid, 159.  
 Caruncle, 463.  
 Case, instrument, for army surgeon, 387.  
 Cataract, 78, [145], 158, [339], 462, [585].  
     750, 813, 879.  
     absorption of, 702, 750, [863].  
     after, 462, 813.  
     blue, 360, 535, 749.  
     congenital, [59], 78, [144], 158, 301, 389,  
         462, 621, 813, 879.  
     coralliform, [732], 879.  
     diabetic, 78, 702.  
     from atmospheric pressure, 78.  
     from electric injury, 702.  
     from trauma, 621, 750.  
     glaucomatous, 158.  
     lamellar, [431], 621, 750, 813.  
     macular perception in, [128].  
     nonoperative treatment of, 158.  
     senile, 83, 158, 389, 542, 750, 813, [863].  
     spontaneous cure of, 300.  
 Cataract extraction, 78, 220, 300, 389, 462,  
     542, 621, 702, 731, [734], 750, 879.  
     hysteria in, [274].  
     infection after, 389, 462.  
     intracapsular, 78, 345, [370], 389, 621, 813.  
     irrigation in, 389, 542.  
     reclination of, 542, 813.  
     results after, [142], 813, 879.  
     suture of cornea in, 78, 702.  
 Catheter, 814.  
 Cautery, 540.  
 Cavernous sinus, 815.  
 Cerebral lesions, vision in, 270.  
 Cerebro-spinal fever, 79.  
     meningitis, 647, 751, 752.  
 Cervical sympathetic, 597, 815.  
 Chalazion, 79, 622.  
 Chancre, 301, 620.  
 Charts, Bissell and Haitz, 20.  
 Chemosis, 160.  
 Chemotherapy, 748.  
 Chiasmal lesions, 301, 390.  
 Chicago Ophthalmological Society, 137, 154,  
     196, 345, 434, 537, 516, 678.  
 Chickenpox, [574], 622, 703.  
 Choked disc, 79, 159, 622.  
     and supraoptic canal, 703.  
 Choloramin, 387.  
 Chorioretinitis, 118, 389, 620, 621, 750.  
 Choroid, atrophy of, 300.  
     coloboma of, 157.  
     degeneration of, 299.  
     nodules in, 220.  
     ossification of, 78.  
     sarcoma of, 160, 422, 543, 752, 822, [853].  
 Choroidal membrane, 390.  
     scar, [574], 621.  
 Choroiditis, 55, 300, 749.  
     disseminated, 55, 157.  
     parapapillary, 389.  
     traumatic, [143].  
 Chromatophoromas, 97, 815.  
 Cilia, in anterior chamber, 221.  
 Ciliary growth after cataract extraction,  
     [734].  
 Ciliary nerves, 220, [502], 621, 749.  
 Cilio-retinal arteries, 495, [509], 621.  
 Cinema, and eyestrain, 160.  
 Cinephotoscopia (Skiascopy), 387.  
 Circulation, and tension, 590, 591, 815.  
 Claude Bernard-Horner syndrome, [274].  
 Cocain, 220, 606.  
 Collargol, 811.  
 College of Physicians of Philadelphia, Sec-  
     tion on Ophthalmology, 55, 204, 504,  
     582, 732, 861.  
 Colloidal sulphur, 607, 701.  
 Collyria, 387.  
     and tension, 603.  
 Coloboma,  
     of choroid, 157.  
     of iris, [62], 78, 157, 220.  
     of lids, 79, [145], [204], 301, 391, 622.  
     of macula, 463.  
     of optic nerve, 622.  
 Colorado Ophthalmological Society, 58, 140,  
     339, 443, 512, 584.  
 Color and hearing, 622.  
     blindness, 159, 376, 390, 457, 463, 542, [586],  
         622, 703, 746, 813, 814.  
     fields, 557.  
     mixture, 703.  
     perception, 301, 463, 557.  
     sense, 221, 362, 390, 879.  
     tests, 703.  
     vision, 79, 159, 221, 301, 390, 463, 542, 879.  
 Colorimetric research, 389.  
 Coma, 701.  
 Comparative ophthalmology, 80, 221, 302,  
     704, 880.  
 Compensation, 302, 487, 623, 704, 746.  
 Computation of injuries, 487.  
 Concussion, 77, 80, 159, 220, 291, 426, 543,  
     752, [795], 814.  
 Congenital cataract, [59], 78, [144], 158, 301,  
     389, 462, 621.  
 Congress of medicine in Spain, 392.  
     Oxford Ophthalmological, 384, 614.  
 Conical cornea, see Keratoconus.  
 Conjunctiva, 12, 78, 157, 219, 300, 388, 462,  
     541, 620, 702, 748, 812, 878.  
     amyloid degeneration of, 812.  
     argyrosis of, 812.  
     contagious disease of, [503], 702.  
     pemphigus of, 545.  
     plasmoma of, 719.  
     prenatal infection of, 462.  
     syphilis of, 13, 157.  
     tuberculosis of, 541, 608, 620, 702, 709.  
     tumors of, 221, 302, 543, 622, 703, 719.  
     vessels of, 749.

- Conjunctival flap, 220.  
   incision, 162.  
 Conjunctivitis, 78, 157, 219, 388, **480**, 541,  
   620, 812, 878.  
   catarrhal, 78, 220, 748, 812.  
   epidemic of, 541, 702.  
   experimental, [676].  
   gonorrheal, 78, 300, 481, 812, 878.  
   hypertrophic, [196].  
   infectious, [143]. 157, 300, 541.  
   kerato-, 388, 812.  
   lead, 541.  
   leptothricosis, **705**.  
   membranous, **91**, 300, 388.  
   meibomiana, 645.  
   necrotic, 157.  
   of fornix, **562**.  
   Parinaud's, 157, 300, 388, **499**, 541, [607].  
   [608], 702, 705, 812.  
   phlyctenular, 157, 220.  
   pneumococcic, 388.  
   provoked, [274], 388, 541, 620, 702.  
   pseudomembranous, 78.  
   purulent, 300, 388, 541, 752.  
   vernal, 157, **259**, 388, **404**, 541, 749, 812.  
 Conservation of vision, 153, 222, 392, 464.  
   617, 618, 623, 816.  
 Constitutional disease, 621, 704.  
 Contagion, [503], 540.  
 Contusion of globe, 77, 80, 391.  
 Convergence, 157, **667**, 701.  
   after injury, 620.  
   insufficiency, 541.  
 Convulsions and blindness, 464.  
 Cornea, 78, 157, 220, 300, 388, 389, 462, 541,  
   620, 702, 749, 812, 813, 878.  
   anomalies of, 78.  
   defect of, 749.  
   discoloration of, 389.  
   perforation of, 158, 620, [509].  
   regeneration of, [735], 878.  
   resorption of, 541, 702.  
   sensibility of, 389.  
   staphyloma of, 300, 749.  
   tubercle of, 389.  
   tuberculosis of, [140], 300, 388, [446].  
   [515], 621, 879.  
   tumor of,  
 Corneal abscess, [340], 462.  
   cyst, 620.  
   degeneration, 204, 389.  
   dystrophy, [450], 462, 749.  
   haze, 389, [445], 620.  
   loupe, 339.  
   opacity, 78, 359, 462, [510], 621, 812.  
   suppuration, 301.  
   synechia, 78, [340].  
   syphilis, 388.  
   tattooing, 78, 749, 847.  
   thermotherapy, 78.  
   transplant, 566, 702.  
   ulcer, 58, [135], **152**, 157, 220, 300, 379,  
   [445], [512], [573], [584], 620, **665**, 702.  
   749, 796, [796], 812, 813, 879.  
 Corneo-scleral trephining, 78, **94**, 158, 300,  
   389, 529, 629, 630, [683], 750, 813.  
 Corrections, 297.  
 Correspondence, 152, 216, 288, 289, 290, 377,  
   458, 461, 534, 536, 614, 616, 694, 744, 805.  
 Corrosive sublimat, 79.  
 Cortex, occipital, 159.  
 Couching for cataract, 220, [279], 389, [741].  
 Council of National Defense, 746.  
 Credé method, **458**.  
 Crossed eyes, see Strabismus.  
 Crystalline lens, 78, 79, 158, 220, 300, 389,  
   462, 542, 621, 702, 750, 813, 879.  
   dislocation of, [61], [142], **177**, 302, 389,  
   462, [514], 543, 573, 702, 750.  
   embryonal growth in, 79.  
   in glaucoma, **427**.  
   pigment in, 157.  
   shagreen, 813.  
 Crystalloid formations in retina, [675].  
 Culdesac, reconstruction of, 543.  
 Cyclitis, 78, 157, 160, 220, [451].  
 Cycloplegics, **673**.  
 Cylindroma, 815.  
 Cyst, [573].  
   blood, **625**.  
   hydatid, 367.  
   of cornea, 620, **625**.  
   of iris, 504, [574], 621, 623.  
   of hypophysis, 159.  
   of optic nerve sheath, **17**, 159, 703.  
 Cysticercus, 751.  
 Cystic tumor, 79, **424**.  
 Cytology of eye, 816.  
 Dacryocystitis, 79, 159, 543, 622, 751, 785,  
   814, 879.  
 Dacryocystorhinostomy, 751.  
 Dakin's solution, 462.  
 Daturin, **673**.  
 Daylight screen, 190, **458**.  
 Deaf, 749.  
   schools for, 392.  
 Death, after orbital injury, 160, 815.  
   signs of, 391, 540, 747.  
 Deaths.  
   Art, F. R., 292.  
   Barnard, A. T., 217.  
   Barraza, F., 617.  
   Beardsley, C. E., 292.  
   Bermann, I. S. L., 458.  
   Bernheimer, S., 617.  
   Bock, E., 292.  
   Bolling, R. C., 617.  
   Browne, E. A., 292.  
   Burrows, L. B., 807.  
   Caffey, H. B., 293.  
   Campos, 293.  
   Carter, B., 876.  
   Castellanos, J. G., 617.  
   Castle, C. H., 381.  
   Cerny, G., 876.  
   Chase, J., 458, 694.  
   Coleman, W. F., 293.  
   Conway, W. F., 876.  
   Couper, John, 573.  
   Cox, A. J., 381.  
   Couto, A. Da Graca, 293.  
   Cowperthwaite, E. G., 617.  
   Craig, W. G., 293.  
   Culver, C. C., 876.  
   Davis, C. H., 876.  
   Delens, E., 293.  
   Dietrich, W. A., 475.  
   Erb, H. B., 293.  
   Eve, F. S., 293.



- Farnsworth, D. B., 293.  
 Farquaharson, H. M., 293.  
 Fisher, R. G., 293.  
 Ford, F. A., 293.  
 Francaviglia, F., 293.  
 Fraenkel, A., 293.  
 Froelich, C., 294.  
 Goldzieher, 294.  
 Guilford, Paul, 876.  
 Guilloz, F., 294.  
 Hanson, E. M., 294.  
 Harnisch, F. C., 694.  
 Heath, F. C., 876.  
 Hepburn, N. J., 537.  
 Hering, E., 383.  
 Hickman, H. V., 294.  
 Hirsch, C., 294.  
 Hogsett, C. G., 294.  
 Jessop, W. H. H., 294.  
 Knaggs, F. H., 295.  
 Koontz, A. F., 295.  
 Krüger, 295.  
 Leber, T., 295.  
 Liebreich, R., 295.  
 Longino, R. R., 876.  
 McCabe, E. M., 296.  
 McKay, R. J., 297.  
 Manfredi, N., 296.  
 Marsh, H., 296.  
 Masselon, J., 296.  
 Maxwell, P. W., 296.  
 Mellinger, C., 379.  
 Meyer, D. W., 876.  
 Mills, J., 74, 379.  
 Moffat, J. L., 379.  
 Moore, H. T., 458, 694.  
 Moore, R. L., 381, 217.  
 Moran, T. J., 876.  
 Murray, G. G., 695.  
 Neill, W. J., 379.  
 Nieden, A., 379.  
 Norris, S. C., 699.  
 Ogilvie, F. M., 297.  
 Pergens, E., 380.  
 Pitcher, M., 380.  
 Porter, J. W. H., 876.  
 Posey, A. C., 380.  
 Pretz, G. R., 876.  
 Pritchard, M. R., 380.  
 Provost, A. J., 695.  
 Ranly, J., 876.  
 Ray, J. M., 745.  
 Reily, C. G., 380.  
 Reynolds, J. H., 876.  
 Richardson, R. M., 380.  
 Roaldes De, A. W., 617, 695.  
 Robinson, G. W., 380.  
 Robinson, S. R., 380.  
 Salter, R. W., 697.  
 Sanders, A. F., 537.  
 Santa Cruz, M., 380.  
 Sargeant, F. L., 74, 380.  
 Schirmer, O. W. A., 380.  
 Shoemaker, C. R., 876.  
 Schoen, W., 380.  
 Scott, K., 383.  
 Sherman, H. G., 380.  
 Schur, M., 380.  
 Sicherer, C. von, 458.  
 Smith, J. J., 617.  
 Snodgrass, J., 380.  
 Speyr, T. de, 383.  
 Stanuleanu, G., 380.  
 Stephens, J. M., 697.  
 Sulzer, 297.  
 Thompson, H. W., 297.  
 Tiffany, F. B., 217, 382.  
 Treitel, 381.  
 Todd, F. C., 537, 697.  
 Trommald, E. A., 297.  
 Tull, M. G., 217.  
 Turnbull, C. S., 297, 698.  
 Vibbard, A. A., 381.  
 Walker, G. A., 381.  
 Walling, W., 381.  
 Watson, C., 74.  
 Williams, C. H., 617.  
 Williamson, W., 876.  
 Winslow, W. H., 381.  
 Wolff, B., 381.  
 Wyler, J. S., 866, 876.  
 Zehender, W. von, 381.  
 Decompression, 159, 542.  
 Dementia precox, 185, 302, 392, 813.  
 Degree in Ophthalmology, 700.  
 Dermoid, 302.  
 Desiccation, 58.  
 Detachment of retina, 158, 301, 430, 621, [694], 702, 751.  
 Deviation, conjugate, 159.  
 Diabetes, 77, 78, 813.  
     changes in refraction after, 77, 219, 301.  
 Diagnosis, 72, 77, 157, 219, 299, 387, 460, 541.  
     619, 623, 701, 747, 811, 878.  
 Dichloramin T solution, 462.  
 Dichlorethysulphid (mustard gas), 816.  
 Dionin, 606, 796, 879.  
 Dioptric mean in myopes, 541.  
 Diplopia, 201, 390, 461, 702, 878.  
     false, 461, 747.  
 Diploscope, 541.  
 Dislocation of lens, [61], [142], 177, 302, 389.  
     462, [514], 543, 573, 702, 750.  
 Divergence, 77.  
 Dogs, experimental action of iris in, 702.  
 Draft, examinations at Camp Jackson, 318, [511], 623.  
     medical problems in, 302.  
 Dressings, absence of, [274], 387.  
 Drugs, 811.  
     action of instilled, 603, 701.  
     proprietary and synthetic, 529, 536.  
 Ductless glands, 100, 107, 302, 388, 540.  
     and keratoconus, 388.  
     and retinitis pigmentosa, 107.  
     see also Endocrine organs, and Internal Secretions.  
 Dynamic ocular test, 377.  
 Dysentery, 220, [451], 658.  
 Dystrophy, corneal, [450], 620, 749.  
 Ear, 221, 352, 463, 464, 544, 623, 816.  
     in quinin poisoning, 559.  
 Echiolepharon-prothesis, 751.  
 Echinococcus, 79.  
 Eclipse blinding, 371.  
 Economics, 80, 160, 214, 222, 302, 623, 704, 752, 816, 870.  
 Ectopia lentis, [681], 750.  
 Ectropion, 79, 159.

- Eczema, 388.  
 Edema,  
   of lids, 391, 722, [729], 815.  
   of optic nerve, 751.  
 Editorials.  
   Advertising, 70.  
   American Journal of Ophthalmology, 453.  
   Anales de Oftalmologia, 207.  
   Annals of Ophthalmology, 148.  
   An Ophthalmic Adventurer, Julius Hom-  
   berger, 689.  
   Artificial Eyes vs. Patriotism, 803.  
   Blood Pressure and Intraocular Pressure,  
   373.  
   Colleagues Returning to Civil Practice,  
   867.  
   Complete Files, 865.  
   Eclipse Blinding, 371.  
   Eye Lesions of Infective Jaundice, 452.  
   Frank Chisholm Todd, 692.  
   Institution for Blinded Soldiers, 374.  
   Jesse Sydney Wyler, 865.  
   Neurobiotaxis, 527.  
   Ocular Lesions from Filaria, 609.  
   Ocular Lesions of Influenza, 801.  
   Ophthalmic Aspects of Medical and Sur-  
   gical History of War, 739.  
   Ophthalmic Observation and Progress  
   During the Great War, 740.  
   Ophthalmic Journals, 285.  
   Ophthalmic Record, 206.  
   Ophthalmology, 209.  
   Our beginning, 866.  
   Our Journal Form, 454.  
   Our New Journal, 68.  
   Plan for Mobilization of Physicians, 692.  
   Prevention of Injuries, 284.  
   Price of This Journal, 375.  
   Proprietary Drug Names, 529.  
   Science vs. Sensationalism, 283.  
   The Ophthalmic Year Book, 867.  
   Western Meetings, 528.  
   Wider Use of the Tonometer, 799.  
 Education, 80, 160, 214, 222, 302, 544, 704,  
   752.  
   defects in, 482.  
   of blind, 76, 222, 392, 544.  
 Eel blood serum, 127.  
 Efficiency after injury, 487.  
 Electricity, 88, 815.  
 Electrocautery, 79.  
 Electrolysis, 543.  
 Electrothermic coagulation, 159.  
 Elephantiasis, 391.  
 Elliot's operation, 78, 94, 158, 220, 300, 389,  
   529, 629, 630, [683], 750.  
   infection after, [132], 158, 220.  
 Embolism, loss of sight from, 623.  
   retinal, 197.  
 Embryotoxon, 78.  
 Emetin, 245, 390.  
 Empyema, 301, 622.  
 Encephalitis, 543, 623, 752, 880.  
 Endarteritis, 621.  
 Endocrine glands, 100, 107, 302, 388, 540.  
 Endophthalmitis, 647.  
 Enophthalmos, 542, 732, 751, 815.  
 Entropion, 79, [514], 622, 751.  
 Enucleation, 79, 159, 388, 390, 463, [517]  
   622, 703, 814, 879.  
   immediate, 269, 749.  
   premature, [128].  
 Eosinophilia, 702, 748.  
 Epicanthus, [204], 391.  
 Epilepsy, 391, 463, 464.  
 Epiphora, 542, 814.  
 Episcleritis, 664, 749.  
 Epithelioma, [57], 160, [278], [282], 302, 391.  
   543.  
 Equilibrium, 390, [869].  
 Ergograph, 156, 852.  
 Erysipelas, 752.  
 Eserin, 156.  
 Etherization, 160.  
 Ethmoid, 390, [514], 622.  
   empyema of, 158, 301, 622.  
   mucocoele of, [205].  
 Ethmoiditis, 160, 301, 704.  
 Ethylhydrocuprein, 157, 220, 299, [429], 813.  
 Eugenics, 623.  
 Evisceration, 703, 749, 879.  
 Examinations,  
   American Board for Ophthalmic, 76.  
   of eyes in service, 80, 222, 318.  
   state, 80.  
 Exanthematous typhus, 880.  
 Exenteration, 463.  
 Exophoria, 157.  
 Exophthalmic goiter, 106, 156, 300, 301, 464  
   543, 703, 751.  
 Exophthalmometer, 811.  
 Exophthalmos, [140], 159, 221, 301, 302,  
   [514], 751, 815, 880.  
   corneal suppuration in, 301.  
   pulsating, 159, 221, 301, 311, 463, 622, 750,  
   751, 815.  
 Exostosis, orbital, 221.  
 Explosion of artificial eye, 79.  
 Explosives, ocular injury from, [274].  
 Extirpation of lacrimal sac, 79, 301, 815, 879.  
 Exudate, massive retinal, 120.  
 Eye, ear, nose and throat surgery, 156, 704.  
   and legislation, 376.  
 Eyeball, 79, 463, 542, 622, 703, 751, 814, 879.  
   avulsion of, 9, 160, 751.  
   bursting of, 751.  
   development of, 46.  
 Eye-ground, 159.  
   examination of infants', 79.  
   color of normal, 390.  
 Eye-strain, 77, 160, 299, 302, 388, 391, 461,  
   464, 748, 811.  
 Facodialysis, 370.  
 Fatigue and psychophysics, [607].  
   in accommodation, 156.  
   retinal, 703.  
 Fellowship in ophthalmology, 746.  
 Fibroma, [341], 463.  
 Field-glasses, 816.  
 Fields of vision, 158, 159, 622, 747, 796, 831,  
   834.  
 Filaria, 122, 159, [450], 543, [609], 622, 750,  
   [805].  
 Fish, exophthalmos in, 302.  
 Fluorescein, 290.  
 Focal infection, 78, 157, 220, 247, 300, 462,  
   623, 660, [693], 749, [787], 814, 816.

- Foreign bodies, 79, 302, 391, 412, [445], 543, 623, 752, 815.  
 position of, 79, 318, 506, 543, 623, 752, 815, 880.  
 removal of, [130], 160, 391, 464, 752.
- Fornix, conjunctivitis of, 562, 702.
- Fovea, 630.
- Fracture of orbit, 703.
- Fraenkel's infection, 388.
- Fragillitas ossium, 389, 462, 620, 749, 812.
- Fulguration, 463.
- Fundus, 79, 331, 387.  
 anomalies, 221, 848.  
 in temporary blindness, 301, 463.
- Fusion, 157, 219, 702, 748.
- Galyi, 540, [687].
- Gases, injuries from, 80, 160, 168, 390, 464.
- General diseases, 80, 160, 221, 302, 391, 623, 704, 752, 816, 880.
- General practitioner, 80, 299, 461, 544, 704, 752, 816.
- German measles, [582], 703.
- Glandothyrene, 751.
- Glands, endocrine, 100, 107, 302, 388, 540.  
 meibomian, 645.
- Glare, effect on eye, 463.  
 of Mesopotamia, 541.
- Glasses, bifocal, [575].  
 contact, 748.  
 history of, 80.  
 protective, 704, 752.  
 Zeiss' punktal and katral, 748.
- Glaucoma, [581], 78, 158, 220, 300, 389, 427, 456, 462, 529, 542, 621, 628, 702, [734], 150, 813, 879.  
 and cataract, 83, 300.  
 etiology of, 183; 389.  
 experimental, 621.  
 herpes and, 158.  
 iris pigment in, 158, 750.  
 juvenile, 158, 220, [683], 750.  
 operations, 78, 94, 158, 300, 389, 529, 629, 628, 630, [683], 750, 813, 879.  
 pathology of, 702.  
 simple, 621, 628, 750, 782, 879.  
 subacute, 78, [736].  
 treatment of, 78, [198], 300, 628, 750.
- Glioma, 423, 714, 750, 815.
- Goggles, 298.
- Goiter, 106, 159, 300, 301, 464, 543, 703, 751, 815, 880.
- Gonorrhea, 78, 812.
- Gonorrheal ophthalmia, 78, 220, [275], [735], 749, 879.
- Gout, 301, 302.
- Graefe's symptom, 474.
- Grafts, conjunctival, 543.  
 corneal, 300, 566.  
 mucous membrane, 464.  
 Thiersch, 856.
- Guides for blind, 538.
- Gumma of lids, 301.  
 of orbit, 79.
- Gunn's dots, 220, 301, 463.
- Haitz and Bissel charts, 20, 156, 408.
- Hallucinations, 622, 704.
- Halifax disaster, 153, 218, 223, 284, 391, 544.
- Headache, 299, [677], [743], 878.
- Health, ministry of, 704.
- Heat, in corneal ulcers, 157.
- Hemeralopia, 79, 390, 463, 465, 621, 703, 750, 813, 814, 879.
- Hemangi endothelioma, 391.
- Hemangioma, 302, 815.
- Hemianopsia, 159, 221, 390, [447], 463, 542, 622, 751, 814.
- Hemiplegia, 156, 159, 811.
- Hemorrhage, 24, 61.  
 after scleral rupture, [274].  
 intestinal, 158.  
 intraocular, [132], 158, [289].  
 orbital, 751.  
 retinal, 220, 462.  
 vitreous, 24, 70, 79, 158, 300, 301, 390, 879.
- Hemorrhagic spirochetosis, 50, 80, 160, 195, 221.
- Heredity, [62], 79, 157, 160, 220, 221, 309, 464, 541, 623, 668, [681], [791], 816, 879, 880.
- Herpes zoster, 79, 158, 220, [502], 541, 621, 748, 816.
- Heterochromia, 157, 749.
- Heterophoria, [860].
- Heterotropia, see Strabismus.
- History, 28, 80, 160, 204, 206, 209, 210, 222, 302, 392, 464, 541, 623, 689, 702, 704, 752, 816, 880.
- Hole in hand test, 219.  
 in macula, 81, 220, 301, [513], 572, 621, 672, 703, 750, 751.
- Holocain, glaucoma after, [194].
- Homburger, Julius, 689.
- Homonymous hemianopsia, 221, 301, 831, [860].
- Hospital, 752, 878.  
 British (Jerusalem), 298.  
 Calcutta, 75.  
 Johns Hopkins, 75.
- Hyaline degeneration, 78.  
 bodies, 703.
- Hyalitis, asteroid, 158.
- Hyaloid membrane, 390, [737].
- Hydatid cyst, 367.
- Hydrogen peroxid, 749.
- Hydrophthalmos, 749.
- Hygiene, 80, 160, 214, 218, 222, 252, 302, 392, 464, [502], 543, 623, 704, 752, 803, 816, 880.
- Hypermetropia, 748, [860].
- Hyperopia, 156, 219.
- Hypophysis, 103, 158, 301, 397, 751, 814.
- Hypotony, 621.
- Hysteria, [77], 390, 463, 464, [575], 632, 751.
- Idiocy, 79, 158, 463.
- Illumination, 80, 160, 250, 390, 392, 540, 544.  
 artificial, 189, 458.  
 for fine work, 160.  
 for operating, 219, [526].  
 standardization of, 156.
- Illusions, 221, 463, 672.
- Indemnity for injuries, 623.
- India, blindness in, 222.
- Industrial injuries, 158, 160, 213, 464, 704.
- Infection after Elliot operation, [132], 158, 220, 813.  
 postoperative, 78, 299, 389, 462.



- Infirmary, Illinois Charitable Eye and Ear, 75.  
 Influenza, 801, 880.  
   and retrobulbar neuritis, 498, 622.  
 Injections,  
   intramuscular, 747.  
   parenteral, [275], 748, 811, 812.  
   quinin, 701.  
   subconjunctival, 219, 299, 811.  
 Injuries, 79, 160, 221, 223, 302, 391, 487, [512],  
   [513], [515], 543, [586], 623, 703, 752,  
   815, 880.  
   birth, 9, 160, 543.  
   brain, 751.  
   contusion, 77, 80, 752, [795], 814, 880.  
   gas, 80, 160, 168, 815, 880.  
   from acids, 302.  
   from ammonia, 302.  
   from burns, 464, 703, 749.  
   from chestnut burr, 752.  
   from copper, 815.  
   from corrosive sublimat, 79.  
   from eel blood, 195.  
   from electricity, 543, 752, 815.  
   from emetin, 245.  
   from eyelash, 80, 221.  
   from golf ball, 815.  
   from iron, 302.  
   from light, 542.  
   from lightning stroke, 88, 302.  
   from naphthalin, 750.  
   from spectacles, [434], 543, 623.  
   from steel, 302, [343], [445], 464, 622, 735,  
   880.  
   from stone, 752.  
   from whip-cracker, 468, 623.  
   from wood, [515], 623, 816.  
   penetrating, 160, 302, 391, 512, 622, 815,  
   880.  
   perforating, 359, 391, [509], 815.  
   prevention of, 392.  
   to choroid, 752.  
   to conjunctiva, 391, 815.  
   to cornea, 391, 752.  
   to eyeball, 80, 160, 815.  
   to lens, 543, 752, 815.  
   to optic nerve, 787.  
   to orbit, 114, [142], 160, 302, [343], 426,  
   623, 703, 704, 815.  
   to pupil, 220.  
   to retina, 752.  
   to sclera, 80, 391.  
   to vitreous, [445], 623, 752.  
   vascular changes after, 776.  
   war, 79, 80, 160, 168, 302, 391, 509, 512, 627,  
   [742], 815, 880.  
 Instruments, 66, 77, 424, 495, 672, 726.  
   portable case for, 387.  
 Insurance, 302, 704.  
 Intraocular pressure, 373, 542.  
 Intracapsular operation, 78, 345, [370], 389,  
   621, 813.  
 Intracranial growths, 301.  
 Iodin, 219, 540, 811.  
 Iontophoresis, 540.  
 Inertia of adjustment, 764.  
 Iridectomy, 78, 300, 567, [683], 701, 750.  
 Iridochoiritis, 813, 879.  
 Iridocyclitis, 78, 220, 300, 462, [514], 621,  
   749, 750, [787].  
 Iridosclerectomy, 220.  
 Iridotaxis, 158, [198], 220, 300, 389.  
 Iris, atrophy of, 1, 157, 336, 462, [510], 621,  
   813.  
   coloboma of, [62], 78, 157, 220.  
   cyst of, [504].  
   in glaucoma, 427.  
   pigmentation of, 220.  
   prolapse of, 879.  
   reposition of, 879.  
   shrinking of, 157.  
   tubercle of, 757.  
   tuberculosis of, 542, [730], 879.  
   tumor of, [194], 420, 463, 623.  
 Iritis, [53], 78, [136], 157, 220, [275], 300,  
   [340], [343], [451], 462, 621, 658, 879.  
   surgery in, 621.  
   syphilitic, 813.  
 Irrigation, 79, 158, 389, [512].  
 Ischemia of retina, [507].  
  
 Jaundice, 452, 458, 543.  
 Jaw-winking, 79, [205], 391.  
 Juvenile cataract.  
   glaucoma, 158, 220, [683], 750.  
  
 Keratitis, 300, 302, 462, 541, 621, 812.  
   aspergillus, 78.  
   catarrhal, 389.  
   cocain, 220.  
   disciformis, 267, [281], 300, 389, 812.  
   fasicular, 157.  
   interstitial, [61], 78, 157, 388, [536], 702.  
   nodular, 389.  
   parenchymatous, 61, 78, 389, 541, 749, 812.  
   profunda, 300.  
   punctate, [205], [340], 389, 462.  
   reapers', 749.  
   trypanosome, 157, 220.  
   tuberculous, [281], 389.  
 Keratoconus, [60], 157, 388, 541, 748.  
 Kerato-iritis, 300, [730], 879.  
 Keratomycosis, 78.  
 Keratoplasty, 78, 541.  
 Keratosis, 301, 389.  
 Kinematography, 812.  
 Koch-Weeks bacillus, 220.  
 Krönlein operation, 115, 880.  
  
 Laboratory diagnosis, 623.  
 Labrador, note from, [744].  
 Labyrinth, 73, 748, 811.  
 Laceration of eyeball, 80.  
 Lacrimal apparatus, 79, 159, 301, [354], 390,  
   391, 463, 543, 622, 703, 751, 814, 879.  
   gland, 159, 751, 814.  
   obstruction, 390, 542.  
   operations, 79, 301, 811.  
   sac, 79, 301, 463, 814, 879.  
   tumors, [131].  
 Lamina cribrosa, 158.  
 Larva, fly, 750.  
 Laughter, and lid movement, 391.  
 Law, composite ophthalmia neonatorum, 43,  
   157, 216, 290, 377.  
 Lead poisoning, 77.  
 Leber's disease, 221.

- Lenses, bifocal, [575].  
    katral, 748.  
    protective, 704, 752, 816.  
    round, 496, 616, 701.  
Lenticonus, 813.  
Leprosy, 704.  
    ophthalmoscopic findings in, 303, 464.  
Leptothrix, 541, 702.  
Leucosarcoma, 79, 463.  
Leukemia, 160, 752.  
Lids, 79, 159, 221, 301, 391, 463, 543, 622, 703, 751, 815, 880.  
    and jaw movements, 79, [205], 391, 815.  
    coloboma of, 79, [145], [204], 301.  
    edema of, 391, 722, 815.  
    elephantiasis of, 391, 815.  
    eversion of, 159.  
    movements of, 79, [205].  
    operations on, 79.  
    specula, [66], 159.  
    tuberculosis of, 703.  
    tumors of, 57, 160, 302.  
Light and color, 503.  
    artificial, 189, 387.  
    bath, 811.  
    injuries, 543.  
    therapy, 748.  
    sense, 556.  
Lipodermoid, 703.  
Little's disease, 816.  
Liver substance in night blindness, 621.  
Localization of foreign bodies, 318, 506, 543, 623, 815, 880.  
Loupe, corneal, 339, 461.  
Lues, 749, 784, 880.  
Lumbar puncture, [450], 463.  
Luxation of eyeball, 9, 160.  
    of lens, [51], [142], 177, 302, 389, 462, [514], 543, 573, 702, 750.  
Lymphangioma, 159.  
Lymphocytic cells, formation of, 816.  
Lymphoma, 391.  
  
Macula, 78, 220, 390, 463, 747.  
    hole in, 81, 220, 301, [513], 572, 621, 672, 703, 750, 751.  
    conservation of, 542.  
    degeneration of, 390, 463, 813.  
    in red-free light, 747.  
Macular perception, [128].  
    arterioles, 406.  
    lesions (unequal pupils), [192].  
Magnet, 79, 160.  
    extraction, [203], 391, 412, 464, 543.  
    giant, 464.  
Malaria, 749, 816.  
Malingering, 219, [344], 461, 619, 747, 811.  
Malta, eye conditions in, 704, 816.  
Massage of lacrimal sac, 473.  
Masseters and eye movements, 393.  
Masseurs, blind.  
Mastication, [687].  
Measles, [582], 751.  
Meckel's ganglion, 36.  
Medico-legal, 153, 160, 290, 302, 623, 704.  
Megalocornea, 78, 541, 620, 879.  
Meibomian glands, 645, 849.  
Melanoblastoma, 97, 302.  
Melanoma, 752.  
Melanosis, 79, 391.  
    of iris, 220.  
Membranous conjunctivitis, 91.  
Meningitis, 221.  
    cerebro-spinal, 647, 751, 752, 880.  
Mentally defective, 391.  
Mercurial therapy, 156, 221.  
Mercury salicylarsinat, 76, 387.  
    idiosyncrasy for, 747.  
Metastatic endophthalmitis, 647, 751.  
    ophthalmia, 703.  
    tumors, 391, 543.  
Methyl alcohol, 79, 158.  
Methylene blue, 152, 290, 379, 389, 462.  
Microphthalmos, 751.  
Microscope, corneal, 794.  
Microscopic findings in cataract, [732].  
Middlemore prize, 154.  
Migrain, [447], 463, 622, 814.  
Military medal, 700.  
    notes, 75, 154, 217, 298, 384, 459, 538, 618, 700, 745, 752, 880.  
    service, 540, 692, 745, 816, 867, 878, 880.  
    surgery and practice, 816.  
Mind blindness, 751.  
Mineral baths, 77.  
Minimum separabile, 811.  
Miosis, 542, 816.  
Miotics, 158, 621.  
Mirror reading, 301.  
    writing, 390, 463.  
Mongolianism, 301.  
Monocular vision, 487, 751.  
    and depth perception, 751.  
Mooren's ulcer, 220, [573], 621, 702.  
Mota's operation, 622, 815.  
Mountain warfare, eye wounds in, 816.  
Mucocoele, of ethmoid, [205].  
    of orbit, 391.  
Multiple sclerosis, 816.  
Mumps, 462, 751.  
Muscles, function of oblique, 157, 393.  
    paralysis of, 172, [273], [277], 388, 462.  
    shortening, 161.  
Myasthenia gravis, 816.  
Mydriasis in wounds of of skull, 813.  
Mydriatics, 673.  
Myiasis, 221, 703.  
Myoclonus, 701.  
Myopia, 299, 461, 464, 541, [575], 701, [738], 748, [860].  
    cause and prevention, 219, 299, 388, 541.  
Myxoglioma, 879.  
  
Naphthalin, 750.  
Nasal disease, 80, 221, 353, 464, 542, [745], 816.  
National advisory committee, ophthalmic, 392.  
Necrotic conjunctivitis, 157.  
Needling for cataract, 138, 462.  
Neoplasm, intraocular, [436].  
    nonpigmented, 622.  
Neosalvarsan, 387.  
Nephritis, trench, 158, 220, [275], 813.  
Nernst lamp and corneal microscope, 747.  
Nervous disease, 464, [693].  
    and syphilis, [685].  
    vestibular, 620.  
Neurasthenia, [77].

- Neurectomy, 748.  
 Neurobiotaxis, 518, 527, 622.  
 Neuroblastoma, 234, 391.  
 Neuroepithelioma, 159, 160.  
 Neurofibromatosis, 560, 752.  
 Neuroma, 159.  
 Neuroretinitis, [434], [574], 621, 622.  
 Neuroses, war, 816.  
 Neurotomy, 541, 619.  
 Nevus, 220, 221.  
 News items, 74, 153, 216, 383, 459, 537, 617, 699, 745.  
 Night blindness, 79, 390, 463, 465, 542, 703, 813, 814.  
 Nitrat of lead, conjunctivitis, 541.  
 Nodal point, 23.  
 Novarsenobenzol, 77.  
     intrarectal administration of, 77.  
 Novocain, 536.  
 Nurses' training school, 80.  
 Nutrition, cataract with disturbance of, 389.  
     of optic nerve, 390.  
 Nystagmography, 748.  
 Nystagmus, 55, 171, 219, 300, 369, [432], 462, 464, 541, 701, 748, 811, [869].  
  
 Occlusion of artery, [583].  
 Ocular movements, 77, 156, 219, 300, 388, 393, 462, 473, [504], 541, [692], 701, 748, 811, 878.  
     anomalies of, [855].  
     apparatus for measuring, 748.  
 Ocular reflexes, [137], 815.  
 Oculo-cardiac reflex, 302, 391, 543.  
 Oguchi's disease, 390.  
 Onchocera (filaria), 122.  
 One-eyed, 487.  
 Opacities, of cornea, 78, 729.  
     of lens, see Cataract.  
     of vitreous, 220, 621.  
 Operations, 52, 55, 77, 156, 219, 222, 299, 387, 392, 619, 748, 811, 816, 878.  
     corneal, 78, 566, 702.  
     eyeball, 77, 78, 541.  
     glaucoma, 78, 158, 300, 389, 529, 528, [683], 750.  
     lacrimal, 79, 301, 811.  
     lids, 52, 156, 543, 622, 880.  
     muscles, 161, 726, 806.  
     orbit, 55, 79, 159, 370, 391, 463, 543, 622, 703, 751.  
 Ophthalmia, electric, 620.  
     metastatic, 647.  
     neonatorum, 43, 78, 157, 216, 220, 290, 377, 388, 458, 464, 620, 702, 878.  
     nodosa, [443], 812.  
 Ophthalmic adventurer, 698.  
     examinations, 76, 616.  
     literature, index of, 77, 156, 219, 299, 387, 461, 540, 619, 701, 747, 878.  
     practice, 482.  
     Record, 149, 206, 392.  
     vein, ligature of, 301.  
     Year Book, 210, 392, 867.  
 Ophthalmoblennorrhoea, 78.  
 Ophthalmolindemann, 619.  
 Ophthalmological Societies.  
     American, 215, 453, 623, 729, 805, 787, 851.  
     Chicago, 137, 154, 196, 345, 434, 537, 596.  
     Colorado, 140, 339, 443, 512, 584.  
     Detroit, 384.  
     Netherlands, 429, 674.  
     Oxford, 384, 614.  
     Pittsburgh, 276.  
     Mexican, 537.  
     Section, A. M. A., 376, 536.  
     Section, College of Physicians, Philadelphia, 55, 204, 504, 582, 732, 855.  
     Section, Royal Society Medicine, 573.  
     Section, Southern Medical, 129.  
     United Kingdom, 160, 218, 501, 534, 623.  
     Wills Hospital, 29, 144, 201, 358, 447, 515.  
 Ophthalmologists, council of, 392, 544.  
     in Army service, 80, 154, 302, 385.  
 Ophthalmology, history of, 28, 209, 214, 289, 392.  
     medical, 211, 222.  
     progress of in Philadelphia, 28, 160, [216], [289], 392.  
     school of, 817.  
     science of, 160.  
     war, 151.  
 Ophthalmometer, 219.  
 Ophthalmoplegia, 462, 464, 543, 570, [687], 702.  
 Ophthalmoscope, [129], 219, 299, 387, 611.  
     electric, 852.  
 Ophthalmoscopy, 20, 303, 750; 822, [858], 878.  
     war atlas of, 701.  
 Opiates, 622.  
 Optic disc, 79, [502], 622.  
     choked, 79, 159.  
     hole in, 81, 220, [513], 572, 703, 751.  
     neuritis, [127], [202], 390, 463, 542, 571, 582, 622, 749, [787], 814.  
 Optic nerve, 17, 79, 158, 221, 301, 390, 463, 542, 622, 703, 751, 814, 879.  
     atrophy of, [61], [141], 158, 168, 221, [277], 301, 463, 542, 622, 703, [791], 813, 879.  
     fibres of, [60], 157, 159, 221.  
     nutrition of, 390.  
     sheath of, 17.  
     syphilis of, 622.  
 Optical glass, 460, 880.  
     manufacture of in America, 388, 538.  
     schools (Jena), 752.  
 Opticociliary veins, 495, [509].  
 Optics, of Euclid, 541.  
     mechanical, 77, 461.  
     physiologic, 461.  
 Optochin, see Ethylhydrocuprein.  
 Optometry, 377, 392, 704.  
     and a medical degree, 392, 880.  
     in Illinois, 222.  
     in Pennsylvania, 75.  
 Oral and pharyngeal diseases, 247, 354, 392, 462, 464, 623, 749.  
 Orbit, 79, 159, 221, 301, 391, 463, 543, 622, 703, 815, 880.  
     echinococcus of, 79.  
     exenteration of, 622.  
     exostosis of, 221.  
     gumma of, 79.  
     injury of, 114, [142], 160, 302, 343, 426, 623, 703.  
     tumors of, 79, 159, 201, [277], [341], [505], 560, 623, 703, 828, 830, [851], [852], [857].  
     varicocele of, 622.



- Orbital fibroma, [341].  
inflammation, 221.  
hemorrhage, 751.  
mucocele, 391, 622.  
phlegmon, 543, 815.  
prosthesis, 391, 463, 543, 622, 815, [854], [863], 880.  
suppuration, 221.  
thrombosis, 815.
- Orientation, 159, 703, 814.
- Orthoscope, 387.
- Ossification of choroid, 78.
- Osteoma, 160.
- Osteoplasty, 878.
- Otitis media, 388, 812, 878.
- Oto-laryngology, index of, 700.
- Otosclerosis and blue scleras, 726.
- Ovarian secretion and loss of vision, 751.
- Oxycephaly, 751, 760.
- Pannus, 812.
- Panophthalmitis, 79, 389, [674], 703.
- Papilledema, [424], [450], 463, [579], 622, 703.
- Papilloma, 160.
- Paralysis, 77, 172, [273], 388, 462, 463, 464, [504], 620, 812.  
abducens, [277].  
congenital, 388.  
facial, 77, 221.  
infantile, 219, [273], 752.
- Parasites, 122, 159, 221, 543, [609], 614, 622, 703, 751, 880.
- Parenchymatous keratitis, [61], 78, 157, 388, 389, [536], 541, 702, 749.
- Parenteral injections, [275], 748.
- Paresis, 704.
- Parinaud's conjunctivitis, 157, 300, 388, 499, 541, [607], 702, 705.
- Pasteurization, 702.
- Pathology, 80, 159, 160, 391, 464, 543, 623, 704, 816, 880.
- Pedigrees, [62], 79, 157, 160.
- Pellagra, 814, 834.
- Pelvic disorders and eyestrain, 392.
- Pemphigus, 545, 702.
- Penal institutions, clinic in, 816.
- Perception of brightness, 368, 463.  
of depth, 751.
- Perforation of cornea, 462.  
in glaucoma, 158.
- Perimetry, 156, 189, 387, 408, 747.
- Perspective vision, 236, 237, 390.
- Phlegmon of orbit, 543, 815.
- Phoro-optometer, 20.
- Photophobia, extreme, 878.
- Physicians, mobilization of, 692, 816.
- Physostol, 78.
- Pigmentation, 543.  
crystalline lens, 157.  
iris in glaucoma, 158.  
retinal, 107, 220, 221, 389, 390, 747.
- Pink eye, 78.
- Plague, 80.
- Plasmoma, 719, 812.
- Plastic operations, 159, 751, 752.
- Pneumococcus ulcer, [135].
- Polioencephalitis, 543.
- Pollakiuria, 811.
- Polycoria, 749.
- Polycythemia, 302.
- Postoperative infection, 78, [132], [158], 220, 299, 389, 462.
- Pregnancy, enophthalmos in, 713.
- Prevention of blindness, 218, 392, 460, 704, 752.
- Prism apparatus, 747.
- Prize, Middlemore, 154.
- Prevention of blindness, 218, 880.
- Probing, 814.
- Proceedings, see Ophthalmological.
- Procain and novocain, 536.
- Professional relations, 80, 160, 222, 302, 392, 464, 544, 623, 704, 752, 816, 867, 870.
- Prognosis and hopeless cases, [738].
- Proptosis, 160.
- Protective glasses, 704, 752, 816.
- Protein therapy, 461.
- Prosthesis, 79, 391, 463, 622, 751, 878, 879.  
bone, 159.  
cartilage, 370.  
lid, 543.  
orbital, 391, 463, 543, 622, 815, [854], [863].
- Pseudoparesis, 160.
- Psychology in head injury, 159.
- Pterygium, [443], [505], 620, 878.
- Ptosis, 52, 159, [277], 301, 388, 391, [444], 542, 543, 622, 815, 816.
- Pupil, 78, 157, 220, 389, 462, 621, 702, 879.  
Argyll-Robertson, 462, 542, 813.  
dilation of, 389, 813.  
dilator, [674].  
inequality of, 78, [192], 813.  
innervation of, 220.  
narrowing of and tension, [139].  
reaction of, 462, 813.  
reflex of, 462, 621, 813.  
width of, 542.
- Pupillary disc, [129].  
membrane, 751.  
pigmentation, 749.  
segment, 749.
- Pyorrhea alveolaris, 463.  
and blepharospasm, 338.
- Quinin amblyopia, 390, 547, 560.  
hydrochloric injection, 701.
- Radiation, 748.
- Radiography, 80, 704.
- Radium, 463, 619, 703, 714, 814, 815.  
in vernal conjunctivitis, [194], 404, 541, 812.
- Rank of medical officers, 75, 218, 460.
- Rectus muscle in biting, 393.
- Red-free light, 387, 540.  
green blindness, 390.  
sensation of, 390.
- Reeducation of blind, 302, 392.
- Reefing operation, 157.
- Refraction, 77 [129], 156, 219, 299, 387, 461, 541, 620, 630, 667, 701, 748, 811, 878.
- Repair of cornea, 752.
- Resection of globe, 221.  
of sclera (Müller's), 158.
- Retina, 79, 158, 220, 301, 389, 390, 463, 542, 621, 702, 750, 813, 879.  
angioid streaks in, 583, 703, 750.  
crystalloids in, [675].  
massive exudate in, 120, 301.  
of Mexican axoltl, 80.  
physiology of, 463.  
regeneration of, 879.  
rods and cones, of, 158.  
thrombosis, 813, 814.

- Retinal, anastomosis, 750.  
   aneurysm, 12, 390.  
   angiosclerosis, 703.  
   arteries, 12, 59, 158, [280], 390, **495**, [583], 703.  
   degeneration, 751, 879.  
   detachment, 158, 301, 621, **694**, 702, 751.  
   embolism, 197, 390, 813, 814.  
   epithelium, [737], 814.  
   exudate, 120, 301.  
   fatigue, 703.  
   glioma, **423**, 714, 750, 815.  
   hemorrhage, 813, 879.  
   ischemia, [507], 621.  
   pigment, 107, 220, 221, 389, 390, 747, 814.  
   sclerosis, [59], [584], 813.  
   tuberculosis, 177, [143], [144], 177, 301, 463.  
   tumors, 234, 391, **423**, 715.  
   vessels, 621.  
 Retinitis.  
   central, 390, 672.  
   chorio-, 118.  
   circinate, 390, 814.  
   diabetic, 301.  
   pigmentosa, 107, [731], 813, 879.  
   proliferans, 301 [515], 621.  
   renal, 702.  
   syphilitic, 158.  
 Retinochoroiditis, 221, [344], 463.  
   juxtapapillaris, [132], 301, 542.  
 Retinoscope, [129], 299.  
 Retrobulbar optic neuritis, [127], 158, 390, [439], **498**, 622, 665, [787], 814, 879.  
 Rhabdomyoma, 391.  
 Rheumatism, 302, 607, 701.  
 Rhinoestrus nasalis, 703.  
 Righthandedness and vision, 703.  
 Rods and cones, function of, 158.  
 Roentgenography, 159, 747.  
 Roentgen image, 747.  
   rays, 58, 397, 811, 814, 815, **830**, [852], 879, 880.  
 Round lenses, **496**, **616**, 701.  
 Rupture of carotid, 815.  
   of choroid, 880.  
   of sclera, [274], 813.  
 Russells' nodules, 388.  
 Salt solution in gonorrheal conjunctivitis, 300.  
 Salicylarsinat of mercury, 461.  
 Salvarsan, 156, 202, 387, 543.  
   and optic atrophy, 390.  
 Sarcoma, 79, 391.  
   of choroid, 160, 422, 543, 752, **822**, [858].  
   of conjunctiva, 622.  
   of iris, [194], 815.  
   of orbit, 79, 159, 201, 302, 391, [858].  
   of optic nerve, 543.  
 Scar, choroidal, 574, 702.  
 School for munitions workers, 704.  
   for nurses, 80.  
   hygiene, 80, 222.  
   lighting, 392.  
   of ophthalmology, (Ft. Oglethorpe, Ga.) 817.  
 Science vs. sensationalism, **283**.  
 Sclera, 78, 157, 220, 300, 462, 541, 702, 749, 812, 878.  
   abscess of, 541.  
   blue, 389, [431], 462, **726**, 812.  
   injury of, 80, 391, 813.  
   perforation of, 769, 813.  
   tuberculosis of, [140], 300, 388, [446], [515], 621.  
   tumor of, 79.  
 Sclerectomy, 621.  
 Scleritis, 300, 341, 462, [515].  
 Sclero-corneal trephining, **94**, 300, 389, 629, 630, [683], 750, 813, 879.  
   loss of eye with, [729], 879.  
   tuberculosis with, [140].  
 Sclerosis, disseminated, 391.  
   insular, [127].  
   multiple, 816.  
 Scotoma, [503], 814.  
   central, **406**.  
 Scotometer, 299.  
 Screen, reversible stereoscope, 701.  
 Scrofula, 77, 543.  
 Scrofuloderma, 55, 157.  
 Sella turcica, 221, 763.  
 Serobacterins, [275].  
 Serpent ulcer, 157, 702.  
 Serum therapy, 78, [275], 301, 388.  
 Sex and hereditary eye disease, 160.  
 Shield, 389.  
 Shot wounds, 79, **114**, [145], 159, 302, 463, [735], 752, 815, 880.  
 Siderosis, 220, 815, 880.  
 Simulation, 78, [274], 388, 461, 540, 619, 747, 811.  
 Sinus disease, **324**, 390, 464, 622, 705.  
   and optic atrophy, 301, **390**.  
   thrombosis of, 159.  
 Skiametry, 299.  
 Skiascopy, 77, 387, 701.  
 Skull, wounds of, 159.  
 Sleep, tonometry in, 158.  
 Smallpox, experimental, 812.  
 Smith Indian operation, 78, 345, 462, 621.  
 Societies. See Ophthalmological.  
 Sociology, 78, 80, 160, 392, 464, 623, 704, 752, 816, 880.  
 Socket, [55], [854], 879.  
   contracted, 15, [282], 301, 391.  
 Sodium santonat, 814.  
 Sodium, sulphat of, 812.  
 Soldiers, visual requirements, 160, 464.  
 Somatic changes in eye, 464.  
 Sophol, 812.  
 Sparganose, 880.  
 Specimens, microscopic, 388.  
 Spectacles, 160, 299, 811, 816.  
   injury from, [434], 543, 623.  
   for soldiers, 464, 816.  
   makers, 752.  
 Spectrum, 301.  
 Speculum, 66.  
 Sphenoid, tumors of, 816.  
 Sphincter, incomplete, 621.  
   iris, [674].  
 Spirocheta pallida, 541.  
 Spirochetosis, 80.  
   icterohemorrhagica, 50, 160, 195, 221.  
 Sporotrichosis, 221.

- Spring catarrh, see Vernal conjunctivitis.  
 Staining of corneal ulcer, 152, 290, 379, 389, 462.  
 Stanculeanu, George, tribute to, 80.  
 Standards, visual.  
   in British army, 160.  
   for recruits in U. S. army, 540.  
 Staphyloma, corneal, 300.  
 Star-shaped figure in macula, 463.  
 Statistics, 220, 544.  
   myopia, 299.  
   nystagmus, 541.  
   sympathetic ophthalmia, 220.  
 Steel, 79, [142], 160, [735].  
 Stenopaic slit, 748.  
 Stereoscope, 20, 236, 388, 390, 456.  
   reversible, 701.  
 Strabismus, [63], 77, 78, 156, 157, 300, 428, 541, [576], 620, 667, 702, 727, 748, 783, 806, 812, 878.  
 Stump formation, 159.  
 Subconjunctival injections, 219, 299, 811.  
 Suction method in cataract extraction, 78.  
   movements and eyelids, 472.  
 Suppuration after cataract extraction, 158.  
   corneal, 301.  
   of canaliculus, 159.  
 Surgery, military, 222.  
 Suture in cataract extraction, 78, 301, 542.  
   in muscle operations, 164.  
 Symblepharon, 157.  
 Sympathetic disease, [66], 78, 79, 157, 158, [194], 220, 389, 542, 621, [678], 702, 713, 749, 813, 816.  
   blood count in, 621.  
   ophthalmitis, 79, 389, [674], 703.  
 Syndrome, Claude Bernard-Horner, [274].  
   neuroparalytic, 543.  
   traumatic, 543.  
   Weber's, 156, 463.  
 Synechia, corneal, 78, [340].  
 Syphilis, 13, 80, 157, 160, 221, 302, 387, 388, 391, 422, [439], 463, 464, 540, 622, [685], [687], 812, 813, 816.  
 Systemic disease, 621, 704.  
 Tabes, 221, 390, 704.  
 Tapestries, history of glasses in, 80.  
 Tarsectomy, 751.  
 Tarsus, [133], 301.  
   defect of, 849.  
 Tattooing, 78, 749, 847.  
 Teeth, 220, 250, 300, [343], 462, 660, 749, 814.  
 Temperature in tuberculosis, 116, 302.  
 Tendon shortening, 156.  
 Tenonitis, 302.  
 Tenotomy, 702.  
 Tension, 542, 587, 750, 799, 813.  
   arterial, 300, 702.  
   intraocular, 300, 462, 813.  
   with narrowing pupils, [139].  
   variations, 158.  
 Test type, 156, 387, [574], 701.  
   lenses, 748.  
 Tetanus, 160.  
 Thalamometer, 813.  
 Therapeutics, 54, 77, 156, [196], 219, 221, 299, 387, 461, 540, 619, 701, 747, 811.  
 Thermometer for blind, 704.  
 Thermophore, in corneal ulcers, [135], 300.  
 Thermotherapy, [54], 78, 157.  
 Thiersch graft, [856].  
 Thorium oxid, 619.  
 Threshold test, 621.  
 Throat and eye, 80.  
 Thyroid deficiency, 879.  
 Tonometer, 542, 799.  
 Tonsils, 249, 300, 660, 749, [787], 879.  
   removal of, in iritis, [136].  
 Tower skull, see Oxycephaly.  
 Toxic amblyopias, 77, 79, 158, 390, 622, 703, 750, 814.  
   alcohol, 79, 158, 814.  
   arsenic, 621.  
   emetin, 390.  
   ethylhydrocuprein, [429], 814.  
   from manufacture of explosives, 622.  
   lead, 390.  
   quinin, 390, 547, 650, 703.  
   santonin, 703.  
 Trachoma, 75, 78, 157, 219, 220, 231, [272], 306, 388, 462, 493, 541, 620, 702, 749, 812, 816, 878.  
   and the army, 80, 812.  
   commission, 135.  
   in Italy, 220.  
   therapy, 195, 812.  
 Transactions, see Ophthalmological Societies.  
 Transplantation, corneal, 300, 566, 702.  
   of mucous membrane, 464.  
 Trephining, 78, 94, 158, [203], 389, 462, [502], 621.  
   enucleation after, [729].  
   postciliary, 158.  
 Trial frame, 748, 852.  
 Triplex glass, 160, 704, 752.  
 Trophic changes in muscles, joints and nails, 622.  
 Trypanosomes, 157, 220.  
 Tubercle of cornea, 389.  
 Tuberculin, 119, 392, 461, 543, 748, 753, [792], 816, 880.  
 Tuberculoma of iris, 757, 880.  
 Tuberculosis, 30, 116, 221, [281], 300, 392, 543, 752, 816, 880.  
   conjunctival, 541, 608, 620, 749.  
   corneal, [140], 300, 388, [446], [515], 621, 879.  
   iris, 542, [730], 757.  
   intraocular, [733].  
   lids, 703.  
   optic nerve, 751, 752.  
   retinal, 117, [143], 301, 463.  
   sclero-corneal, [140], 300, 388, [446], [515], 621.  
   temperature in, 116.  
   uveal, [341], [446], 621, 702, 749, 879.  
 Tumors, 79, 97, 159, 221, 302, 391, 417, 463, 543, 622, 703, 815.  
   antrum, 79, 302.  
   choroidal, 160, 221, 391, 422, 543, 752.  
   conjunctival, 221, 302, 543, 622, 703, 719.  
   cystic, 79.  
   filarial, 122, 805.  
   iris, [194], 420, 463, 623, 815, 880.  
   lacrimal, [131], 302, 391, 703.  
   lid, 57, 160, 302.  
   limbus, 391.  
   optic nerve, 79, 159, 543, 815.



- orbital, 79, 159, 201, [277], [282], 302, [341], [391], 463, [505], 560, [582], 622, 623, 703, 752, 815, 828, 830, [857], [858], 880.
- pedunculated, 302.
- polypoid, 622.
- retinal, 234, 391, 423, 715, 815.
- scleral, 79.
- sphenoid, 816.
- Typhoid bacilli, 157.
- fever, 80, 221.
- Ulcer of cornea, 58, [135], 152, 157, 220, 300, 379, [445], [512], [573], [584], 620, 665, 702, 749, 796.
- Ultraviolet light, effect on eye, 543, 749, 811.
- Unidexterity, 301.
- Uremia, blindness in, 221.
- Uveal tract, 78, 157, 220, 300, 389, 462, 542, 621, 702, 749, 813.
- anomalies of, 157, 749.
- gumma of, 749.
- tuberculosis of, [341], [446], 462.
- Uveitis, [60], [66], 78, 157, [340], 462, 621, 662, 702, 750, 879.
- Uveoparotid fever, [433], 621, 749.
- Vaccination, 80, 220.
- Vaccine therapy, 54, 80, 160, [195], 388.
- Vacuum treatment, 542.
- Varicocele, 622.
- Vascular changes after injury, 776.
- Venereal disease, 80, 220.
- Vernal conjunctivitis, 157, 259, 388, 404, 541, 749.
- Vertigo, 219, 63, 702, [869].
- Vision after congenital cataract, 59.
- and righthandedness 703.
- fields of, 158, 159, 622, 747, 796, [795], 831, 834.
- foveal, 630.
- perspective, 236.
- physiology of, 301.
- stereoscopic, 236.
- Visor of steel rings, (Cruise), 154, [502], 623.
- Visual acuity, 71, [77], 156, 288, 387, [430], 461, 540, 554, 619, 701, 752, 811, 878.
- disturbance from cerebral lesions [191].
- illusion, 463.
- Visual tracts and centers, 79, 158, 159, 221, 301, 390, 463, 622, 703, 751, 814.
- standards, 222, 302, 623, 701.
- Vitiligo, 220.
- Vitreous, 24, 79, 158, 177, 220, 301, 389, 813, 879.
- changes in, [279], 389.
- hemorrhages, 24, 70, 79, [143], 158, 390, 813, 879.
- injuries, [445], 623, 752, 879.
- opacities, 220, 621.
- War and the eyes, 392.
- injuries, 79, 80, [742], 815.
- notes, 75, 76, 318.
- sympathetic ophthalmia in, 78.
- Wassermann test, 322, 387, 442, 464, 543, 816.
- Weber's syndrome, 156, 463.
- Weil's disease, 302, 452, 816.
- Welfare of blind, 76, 160, 302, 816.
- West-Polyak operation, 390, 816.
- Whip cracker injury, 468.
- stitch, 164.
- Wills Hospital Ophthalmic society, 29, 144, 201, 358, 447, 515.
- Word blindness, 79, 159, 221, 390, 814.
- Workmen's compensation, 302, 704.
- Xanthelasma, 462.
- Xerophthalmia, 78, 620, 748, 749.
- X-ray therapy, see Roentgen ray.
- Yellow vision, 814.
- Zonule of Zinn, 496.
- Zonulotomy, 750.
- Zoster, 79, 158, 220, [502], 541, 816.





ESSENTIAL ATROPHY OF THE IRIS. FEINGOLD'S CASE.



# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. I

JANUARY, 1918

No. 1

## ESSENTIAL ATROPHY OF THE IRIS

MARCUS FEINGOLL, M. D.,

NEW ORLEANS, LA.

Report of a case from the Eye Department of the Touro Infirmary, New Orleans, La. The eye enucleated and studied in the Laboratory of the Medical Department of the University of Colorado. Histologic examination confirmed the clinical picture, demonstrated Schnabel's cavernous degeneration of the optic nerve and revealed unexpected changes in the retina. Illustrated with one colored plate and five microphotographs. (Read before the Colorado Ophthalmological Congress, August 10th, 1917.)

Because of the rare clinical picture and the interesting histologic findings, the following case deserves recording.

Mrs. B. M., aged 37, dressmaker, called at the Outpatient Department, Touro Infirmary, March 1, 1917, on account of poor vision of her left eye and pain over it.

Closer questioning brought out the following unsatisfactory history: When a child she had measles; since that time the left eye appeared smaller and crossed to the nose; sight was fairly good until November 16, 1916. On that day severe frontal headache on the left side began and lasted for two weeks, with pain extending to the left side of face and accompanied by nausea.

Since then attacks of pain recurred frequently, but were much less severe, came more often in A. M. than in P. M. After the attack of November the eye turned to the temple and the sight was impaired, though she could see large objects. The sight gradually failed and now she can hardly see at all; she cannot do near work for any length of time because it brings on pain and discomfort in the left eye. The left eye never was red. Three years ago glasses were prescribed for her by an oculist who used no drops; was not told, at that time, of

any defects. November, 1916, again saw the same oculist and was told that the iris of the left eye was torn loose and the eye would have to be enucleated. She, herself, had not noticed any particular change in the iris until November, 1916. (Inquiry from the oculist about his findings remained unanswered.)

V. O. D. 5/9; V. O. S. Doubtful light perception.

Retinoscopy: R. E. — 0.50  $\ominus$  — 0.50 cyl. ax. 90°; L. E. — 1.50  $\ominus$  — 0.75 cyl ax. 180°.

With above correction: R. E. V=5/5; L. E. no improvement.

R. E. Anterior portion, media and fundus are perfectly normal. Pupil 3.5 mm. Tn.

L. E. is slightly turned out and up. A few enlarged episcleral vessels. Cornea shiny and perfectly transparent; no precipitations on posterior surface. Anterior chamber is fairly deep, about as in the other eye. The pupil is eccentric, nearer to the upper temporal limbus; it is irregularly quadrilateral with rounded angles; its vertical diameter is about 6.5 mm., the horizontal one about 5 mm. A trace of indirect light reaction. The iris is light brown, as in the other eye and shows several black areas in which all details of iris stroma are entirely absent

These areas vary in size and shape, from very small, like fine clefts between the fibers, to about one-third the size of the pupil. The largest black area begins at the nasal limbus, is sharply defined and extends to about the smaller iris circle; its longest vertical diameter is about 5 mm., the horizontal one about 3 mm. A small more or less round area is situated at the lower limbus, two narrow, long areas are at the upper limbus and a similar somewhat triangular one near the lower nasal limbus. On the temporal side a vertical, long, narrow, almost linear area in the iris is bridged over by fine horizontal brown threads of iris stroma. All these areas are situated in the region of the ciliary portion of the iris and only a few very small ones occupy the sphincter portion. In the balance of the iris stroma the trabeculae are possibly thinner than in the other eye. With oblique illumination and the binocular loupe some of these areas appear brownish black, of the same tint as the retinal pigment at the pupillary margin. These brownish black areas are: the linear one at the upper limbus, one in the lower nasal limbus, one at the lower limbus, and the vertical linear defect in the temporal portion of the iris. (The brown of these defects as well as of the retinal pigment at the pupillary edge in the accompanying picture has been exaggerated for the purpose of illustration.) All other areas are as black as the pupil itself, allow the anterior lens surface to be seen distinctly, and are, therefore, true holes in the iris.

**Ophthalmoscopic Examination:** A very striking picture is produced by the fact that several defects in the iris appear as accessory pupils which allow the light to pass through in the same tone of red as the pupil. These accessory "pupils" are fewer in number than the defects in the iris, and the places where they are missing correspond to the brownish black areas. Media are perfectly clear. Total, overhanging excavation of disc about of 3 to 4 D. T + 3.

On transillumination only the black areas show up bright red like the pupil, the brownish black areas being entirely impervious to light.

Wassermann reaction and physical examination negative.

With the Schiötz tonometer (novocain—cocain anesthesia): R. 20 mm. Hg.; L. 38 mm. Hg.

Application of eserine to L. E. reduced the tension to palpation without giving any comfort, and with no improvement of vision.

During the course of further observation the discomfort continued and patient insisted on enucleation, which was finally done under local anesthesia March 27, 1917.

#### HISTOLOGIC EXAMINATION.

The eye was fixed in Zenker's solution immediately after enucleation. After the customary hardening the eye was bisected in the equator and prepared for sections parallel to the horizontal meridian. Imbedding in parlodion. Lee's cedar oil method of dry cutting.<sup>1</sup>

Anterior portion: Complete series, each section 12 $\mu$ .

Posterior portion: Nothing of interest having been seen with the ophthalmoscope, no serial sections were attempted. Only when examination of the individual sections discovered the interesting condition to be described below was an attempt made at reconstruction by mounting all sections of the particular region. Each section 12 $\mu$ . Cross sections of the optic nerve.

**Cornea:** The epithelium consists of five layers; only in a small area in the upper nasal portion adjoining the limbus of three or four layers; otherwise no defects. Bowman's membrane, parenchyma and Descemet's membrane are entirely normal. The endothelial cells are few, swollen, and are apparently undergoing degeneration; the nuclei stain poorly and each is surrounded on the side toward the anterior chamber by a round colorless halo of protoplasm. The anterior chamber is deep and filled with granular coagulum which contains no formed elements excepting in the lower part; here a number of small round nucleus-like structures are seen which stain poorly with hematoxylin and bear a close resemblance to the nuclei of the endothelium.

Schlemm's canal can be seen in all sections, is wide open and contains blood.

Several sections show in this region a slight infiltration with lymphoid cells and only a few sections some slight pigment accumulation. The meshes of the pectinate ligament cannot be made out distinctly because of the dense adhesion of the iris root to the cornea.

**Iris:** The iris root is adherent to the cornea in all sections to the extent of 0.6 to 0.8 mm., in this way obliterating the angle of the anterior chamber. The defects seen clinically can be traced easily under the microscope in the whole series. The defects are of different degrees; some like the large one adjoining the nasal limbus comprise stroma and pigment epithelium, thus being true holes; others comprise only the stroma and leave the pigment epithelium entirely intact. In those places like the nasal one where the defect, clinically, seemed to extend to the limbus, the microscope shows a small stump of free iris of about 0.2 mm. projecting from the false angle. In some sections the defect in the pigment epithelium is slightly greater than the defect of the stroma. In the vertical defect on the temporal side of the iris one can see the pigment epithelium almost bare, with only a remnant of the iris stroma in the form of one or two fine strands of tissue in front of it. The iris stroma at the edges of all the defects is loose and not covered by any layer of cells; the meshes between the cells seemingly communicate openly with the defect itself and consequently with the anterior chamber; the whole arrangement bears close resemblance to the structure of the iris found around the crypts or at the pillars of a coloboma following an iridectomy. Only the nasal edge of the large hole in the iris shows a different structure; here the edge is rounded off, not teased out as in the other places, and is covered by single flat cells which apparently are a continuation of the cells covering the anterior surface of the iris. No posterior synechia is seen anywhere, not even in those places where the pupillary margin is nearest to the center of the original pupil. The pigment epithelium is thickened and puckered into folds, especially near the defects in the stroma. No

ectropion of the pigment epithelium at the pupillary margin in any place.

In the ciliary portion the iris tissue is on the whole more dense and stains diffusely with eosin, the cells are closer together and the anterior limiting layer shows an accumulation of pigment cells; the sphincter portion, on the other hand, looks more spongy and loose, like the normal. The chromatophores are more or less rounded and show no processes. The blood vessels are remarkably numerous, especially in the ciliary portion of the iris, within the portion adherent to the cornea and in the small stump projecting from it. Some of the vessels show thickened homogeneous walls, but no appreciable decrease in lumen; these vessels are mostly found in the ciliary portion of the iris. In the sphincter portion, on the other hand, most of the vessels have thin, normal walls, and only here and there is one seen having hyalin and thickened walls.

In all sections the sphincter muscle appears normal, the bundles not being appreciably smaller; the seemingly wider separation of the bundles in some of the sections can possibly be the result of the direction of the section on the distorted pupil. The dilator can be seen in almost all sections where the iris stroma is present.

The anterior surface of the iris is covered with a single layer of cells, a continuation of the corneal endothelium; these cells are best seen in the false angle. In a few sections small lumps on the anterior surface of the iris consist of cells with deeply staining nuclei and slight amount of protoplasm, with an occasional pigment cell; some of these lumps are situated on the stump of the iris near the angle, others are nearer to the pupillary margin. The cells of these lumps can, in some sections, easily be seen to be derived from and continuous with the endothelial covering. Nowhere is any accumulation of lymphoid cells found within the iris; single plasma cells are seen only very occasionally.

The posterior chamber shows the same granular coagulum as the anterior chamber, but no formed elements. Lens capsule and lens are entirely normal; the epithelium of the anterior capsule pos-



sibly extends more toward the posterior pole than normally.

The ciliary body is atrophic, apparently more so on the temporal side; the muscle is thin, the processes are long, hyalin, and stain uniformly with eosin; the epithelium covering the tips of the processes is often devoid of pigment. A small cyst in the epithelium is seen on the temporal side. The major iris circle has thin walls, its lumen is wide and contains blood. No cellular infiltration is found in any place.

The vitreous body shows a small detachment in the posterior portion; the remaining space of the interior of the eye between the retracted vitreous and the retina is filled by an exudate which is granular and fine. A more dense and uniform exudate covers the inner surface of the nasal part of the retina and fills the excavation of the optic nerve. Where the exudate is granular it takes the eosin stain and looks like the exudate in the posterior and anterior chambers. Where dense the exudate stains much more deeply with eosin and looks more horny and homogeneous. A few small, round, cells so badly degenerated as to make identification impossible, are seen in the exudate lying in the glaucomatous excavation. The vitreous itself forms a more or less dense fibrillar network containing no cellular elements.

The choroid shows nowhere any cellular infiltration. The blood vessels and chromatophores are entirely normal. Here and there is seen a diffuse and uniform, but faint staining with eosin between the formed elements. The pigment epithelium is entirely intact. At the temporal margin of the disc are seen two small colloid bodies.

**Retina:** On account of the detachment of the retina in the upper temporal portion which occurred during the imbedding, the sections of that part of the retina are not absolutely horizontal and the consequent slight distortion is clearly visible. Traces of edema in the inner nuclear layer are seen as slight spacing out of fibers. Rods, cones, outer nuclear and inner nuclear layers are apparently normal with the slight exception mentioned below. The nerve fiber layer is rather thin on the temporal side, even less

thick than on the nasal side. The ganglion cells are apparently in normal number and appearance on the nasal side. On the entire temporal side, on the other hand, the cells are greatly reduced in number and are entirely missing in an area which begins at the temporal margin of the disc and extends through 1.5 mm. in the direction toward the macula. On the temporal side of this area the ganglion cells suddenly reappear though never reaching the full quota of this region in the normal eye. This area extends in a vertical direction through at least 48 sections of  $12\mu$  each, equaling at least 0.576 mm. Its dimensions are, therefore, at least  $1.5 \times 0.576$  mm. Corresponding to this area the inner nuclear layer contains fewer cells than the adjoining portion.

This area is further characterized by peculiar bodies found only here. They appear in different places in different sections; number from two or three to over thirty; are either arranged in one line or in two or three rows; are always occupying the place where the ganglion cells ought to be, but are here and there found as far as the inner nuclear layer. These bodies vary greatly in size, but all are much larger than the ganglion cells of this area in the normal eye. A number of measurements have been taken and a few examples are here given:  $28 \times 12\mu$ ;  $30 \times 30\mu$ ;  $30 \times 14\mu$ ;  $44 \times 24\mu$ ;  $28 \times 40\mu$ . Some of these bodies show a long process which runs parallel with the nerve fibers and consequently with the inner surface of the retina and can often be traced for about  $70\mu$ . This process at its origin from the body is about  $3\mu$  thick and tapers to  $1\mu$  at its point. These bodies are all surrounded by a clear space which is bridged over by fine threads or ribs connecting the bodies with the fibers surrounding it; the bodies appear more or less homogeneous and show only a few very small vacuoles at the periphery; they contain in the center a nucleus-like structure which varies in shape and size. These "nuclei" are round and may have a diameter of  $6\mu$ ; others are more oval, measuring  $8 \times 36\mu$ ; others again appear more lobulated and remind one of the nucleus of the leucocyte or have a marked resemblance to

a mitotic figure; it often appears as if more than one "nucleus" existed. These details can be seen best with the phosphotungstic acid hematoxylin stain. The bodies and their processes stain pinkish red with eosin, yellow with van Gieson, reddish with Mallory's connective tissue stain, reddish-blue with the phosphotungstic acid hematoxylin. The "nucleus" stains dirty red with eosin, blackish yellow with the Wiegert-van Gieson, a blackish red with Mallory's connective tissue stain and deep blue with the phosphotungstic acid hematoxylin. No structural details can be made out in the nucleus even with the oil immersion, in spite of the perfect fixation by the Zenker's solution.

The optic nerve presents a typical glaucomatous excavation, 1.2 mm. deep, filled with a dense coagulum containing a few fatty degenerated cells. The lamina cribrosa is bulging backward typically; in front of it lies a small amount of reticular tissue as the only remnant of nerve and glial fibers. In the temporal part of the optic nerve immediately behind the lamina cribrosa is an area which attracts attention even of the naked eye because it appears lighter and much less dense. Its greatest dimensions are 0.88 mm. from right to left and 1.1 mm. antero-posteriorly; it extends through at least seventy sections of  $12\mu$  each, corresponding to a vertical diameter of 0.84 mm. It is oval on cross-section and its outlines are not strictly defined. This area is characterized by an entire absence of nerve fibers and contains only fine fibers forming a loose network with large clear spaces here and there. The central retinal artery and vein are wide open, have normal walls, and show only a slight amount of perivascular infiltration with lymphoid cells in some sections. The balance of the optic nerve shows somewhat thickened septa and rather numerous cross-sections of vessels.

#### REMARKS.

In the above description features found in all cases reported<sup>2</sup> will be recognized alongside with characteristics peculiar to this case alone. Some of these features demand further discussion: 1. The clinically clear-cut changes

in the iris which were verified by the microscope: the partial defects affecting the iris stroma only, and the formation of true holes in the iris extending through stroma and pigment epithelium. 2. The clinical and histologic symptoms of glaucoma. 3. The changes in the optic nerve behind the lamina cribrosa: the cavernous degeneration of Schnabel. 4. The changes in the retina at the temporal side of the disc.

The history as well as the clinical and histologic examinations fail to find any cause for the peculiar atrophy of the iris in this case. There is no history of traumatism as in some of the cases, no history or clinical manifestation of any general diseases, like tuberculosis, etc., as found in other instances. It is doubtful how much value can be attributed to the statement that the eye—i. e., the palpebral opening—had been looking smaller since measles in childhood, if this statement is to be used to prove an inflammation at that time. The histologic examination certainly shows no process of such long standing, the whole picture rather bearing the stamp of one of comparatively short duration. Evidences of any inflammation that might have caused the changes in the iris are even less marked than in Wood's<sup>3</sup> case, and are limited to slight infiltration and pigmentation around Schlemm's canal. These and possibly other symptoms such as the changes in the corneal endothelium, the aqueous, humor, the vitreous body and the perivascular infiltration in the optic nerve can easily be explained in another way.

A certain feature in the histologic picture on the other hand is very prominent and might possibly contain an explanation for the changes in the iris. All the defects in the iris were situated in the ciliary portion of the iris, while the pupillary portion had remained fairly intact. At the same time changes in the blood vessels typical of degeneration were found almost exclusively in the remnants of the ciliary portion of the iris, while these changes were nearly entirely absent in the pupillary portion. Although the blood vessels of the two parts of the normal iris are apparently forming a continuous system, the smaller iris circle and its branches seem, in this case



at least, somewhat independent of the blood vessels in the periphery of the iris; it is also worthy of notice that the major iris circle from which all the blood vessels of the iris are derived, appeared normal in all sections. Neither the vascular changes nor the accompanying atrophy of the iris can be considered as the result of the glaucoma and the peripheral anterior synechia for the following reasons: Vascular changes of the iris, when occurring in glaucoma, are not limited to one portion of the iris only; further, when atrophy of the iris is the result of glaucoma, ectropion of the retinal pigment forms an almost constant part of the clinical and pathologic picture; because the atrophy of the iris in glaucoma is generally beginning at the sphincter portion of the iris, and lastly, because the atrophy of the iris of glaucoma only very occasionally extends through the whole thickness of the iris. The coincidence in this case of so many symptoms not usually found in glaucoma compels the only conclusion that these symptoms must be due to some other factor than the glaucoma. Could not, on the other hand, primary changes in the blood vessels based on some embryologic malformation explain all these symptoms? The region of the smaller iris circle is the point of attachment of the embryonic pupillary membrane and its numerous vessels. It is easy to assume that a disturbance of some unknown nature occurring at this particular region may have predisposed the vessels of the ciliary portion of the iris in such manner that they would undergo an early degeneration which, in turn, would lead to atrophy of the whole iris region so affected.

The clinical examination shows in this case, as in all others reported, glaucoma as one of the prominent symptoms. While the histologic examination fully bears out the clinical diagnosis it fails in this instance again to give an explanation of the mechanism how the glaucoma originated. Symptoms of a past inflammation leading to glaucoma are almost nil and while it is perfectly possible that an inflammation leading to glaucoma should pass off without leaving any trace behind, the histologic examination in

this case offers no basis for such an assumption.

The changes in the optic nerve behind the lamina cribrosa, the cavernous degeneration of Schnabel, were also seen in Wood's case, the only other one examined histologically. This symptom was originally thought by Schnabel to be characteristic of and responsible for the glaucomatous excavation but is now admitted not to be pathognomonic of the disease. In this case the secondary contraction assumed by him as the cause of the glaucomatous excavation cannot be upheld: the histologic picture here shows distinct bulging backward of the lamina cribrosa with a rather big degeneration behind it and without any signs of shrinking of the tissue remnants. A peculiar characteristic of the present case is that this degeneration of the optic nerve is limited to the *temporal* region and the question of the relation of this symptom to the changes of the papillo-macular area naturally arises.

Atrophy of the nerve fiber and ganglion layers in the retina on the temporal side are a frequent symptom in glaucoma. But the changes limited to that small area on the temporal side of the disc need a different explanation, and it will be best to first analyze the significance of the peculiar bodies found in this area. On first glimpse these bodies impress one as ganglion cells though they are much larger than these structures; they are situated in the exact location of the ganglion cells, have a nucleus which stains poorly and shows no structural details, are surrounded by a clear pericellular space and seem connected with the surrounding fibers by thin ribs.

In the question as to the nature of these bodies only two conditions must be considered: varicose or ganglionic nerve fibers, also called cytooid bodies, and certain changes found in the retina of the rabbit by Schreiber and Wengler.<sup>4</sup>

The varicose nerve fibers found so frequently and under such varying conditions have, since first discovered, led to a great deal of controversy and were at first looked upon as ganglion cells until the explanation of H. Mueller as to their nerve fiber nature was definitely accepted. Of the many pathologic



conditions under which varicose nerve fibers are seen in the retina not one is present in the case under discussion. There were no hemorrhages, no exudates, no vascular disturbances, no wounds, no swelling of the optic nerve. This certainly must, to some extent at least, militate against the interpretation of these structures as ganglionic nerve fibers. In addition it must be emphasized that these bodies all correspond in their position to the position the ganglion cells should occupy and that what was left of the nerve fiber layer passed over them without this whole region showing any tumor-like formation as is usually seen around varicose nerve fibers.

All accessible illustrations of varicose nerve fibers differ greatly in many characteristics from the bodies found in this case. Only the figure published by Leber<sup>5</sup> of varicose nerve fibers in a case of partial thrombosis of the retinal vein shows bodies greatly resembling those found in the present case, but the picture in question contains in addition large foci of unmistakable and typical varicose nerve fibers. The text and the description of the cut contain no mention of these bodies and it must be inferred that they are to be considered a part of the pathologic condition. In the present case these bodies alone are present and all other characteristics of and conditions accompanying ganglionic nerve fibers are entirely absent. The nature of these bodies is, therefore, still questionable. In connection with this it must be mentioned that the nature of "ganglionic nerve fibers" as being true nerve fibers has been questioned even since the days of H. Mueller.

Schreiber and Wengler, after injection of Scarlet R. oil into the anterior chamber of the rabbit found the ganglion cells in the retina swollen; their chromatin lumps were fewer, broken up and staining poorly, the nucleus often appeared irregularly shaped and its staining properties had been lost. Often they found such protoplasmic mass had assumed double the size of the normal ganglion cells of the rabbit; all this they considered as undoubted symptoms of degeneration. In the atrophy of the retina following experimental severing of the

ciliary arteries Schreiber<sup>6</sup> found the ganglion cells often displaced into the outer layers of the retina, some even in contact with the lamina vitrea. After injection of atoxyl into the vitreous of the rabbit, Igersheimer<sup>7</sup> found similar displacement of the ganglion cells into the inner nuclear layer.

According to Nissl, as quoted by Schreiber and Wengler, the pericellular spaces and the "Spangen" or ribs connecting the cell-like structure with the surrounding fibers are to be looked upon as symptoms of shrinking by the fixation fluids and are, when found in the central nervous system, characteristic of ganglion cells only.

The cell-like bodies found in the present case answer excellently to the description just quoted, and the experiments mentioned show that ganglion cells will be found displaced under different conditions. These bodies may, therefore, be considered as ganglion cells having undergone certain degenerative changes. This view is further strengthened by the absence of ganglion cells in this whole neighborhood, a fact which can be interpreted that the ganglion cells having degenerated utterly the resulting detritus disappeared entirely by absorption. The cells we see must, therefore, be looked upon as the last remnant of the destructive process that went on in this region. A destruction entirely limited to the ganglion cells of a certain area is never found in pure glaucoma and is an unusual picture at all times. To explain this, one can assume that a vascular disturbance limited to this area produced these changes, or that some toxin affected the ganglion cells of this most sensitive area. There is no evidence of any vascular disturbance in the central retinal vessels and their ramifications; all vessels are wide open and show normal intima. A toxic condition on the other hand, affecting the papillomacular area, this most vulnerable because highly specialized region, can be assumed much easier. But if such toxic disturbance occurs it ought to affect all the ganglion cells of the region from the disc to the macula; in this case the destruction of the ganglion cells is limited to a part of that area only. And if it be

argued that the process was farther advanced near the disc and that it would later extend toward the macula, such assumption would be just the opposite from what one would have expected because of the greater vulnerability of the macula proper.

The destruction of the iris tissue must have set free substances which acting in a rather irritating manner on all structures of the eye could have produced changes in the corneal endothelium, in the aqueous humor and the vitreous body; it possibly may have also caused the perivascular infiltration in the optic nerve and even the changes in the retina. The retinal changes of this limited area would then be of a similar nature, as those reported by Schreiber and Wengler in their Scarlet R. experiments, the result of irritation and destruction of the retina evoked by the influence of toxins. Whether the peculiar shape of the nuclei is to be interpreted as an attempt of the cells at mitosis, as found by these authors, cannot be decided in the present case. The resemblance in the phosphotungstic acids preparations, to mitotic figures was certainly very striking and commented upon by all who had seen them.

That much granted, the question still

remains open how this assumed toxemia should have had a selective action on the ganglion cells of this limited area. It is possible that some congenital inferiority so reduced the resistance of this area to the toxins that an early destruction took place here, while the other more resistant portions remained still unaffected. With the longer duration of the process these other parts would possibly succumb later on.

In conclusion it must be said that this case offers no positive explanation for the peculiar clinical entity of essential atrophy of the iris, although some features of the histologic picture could be interpreted that congenital vascular disturbances in the neighborhood of the smaller iris circle may have induced the changes in the iris.

The case, further, gives no explanation for the mechanism of the glaucoma, which is found in all these cases.

The peculiar changes found in the retina are still more difficult to interpret because of the doubt as to their classification, but they must be thought to be the effect of toxins freed by the destructive process in the iris. The last word in this, as in those other questions, is only to be expected with accumulated experience.

#### BIBLIOGRAPHY

1. Feingold M. Trans. Sec. on Ophth. Amer. Med. Assn., 1914, p. 472.
2. Lane, L. A. Ophth. Rec., 1917, p. 285.
3. Wood, C. A. Ophthalmoscope, v. 8, 1910, p. 858.
4. Schreiber and Wengler. Graefe's Archiv für Ophthalmologie, v. 74, p. 1.
5. Leber. Die Krankheiten des Netzhaut. Graefe-Saemisch-Hess Handbuch, 2nd Edition, Fig. 98, p. 406.
6. Schreiber. Graefe's Archiv f. Ophthalmologie, v. 64, p. 237.
7. Igersheimer. Graefe's Archiv f. Ophthalmologie, v. 71, p. 379.





## ESSENTIAL ATROPHY OF THE IRIS. FEINGOLD'S CASE



FIG. 2. LEITZ MICROSUMMAR, 42 MM., NO OCULAR, X 12.  
HEMATOXYLIN-EOSIN. SEC. NO. 155. HOLE IN THE  
NASAL PART OF THE IRIS.\*



FIG. 3. AS FIG. 2: VERTICAL LINEAR DEFECT OF STROMA  
ONLY, IN TEMPORAL PORTION OF THE IRIS.

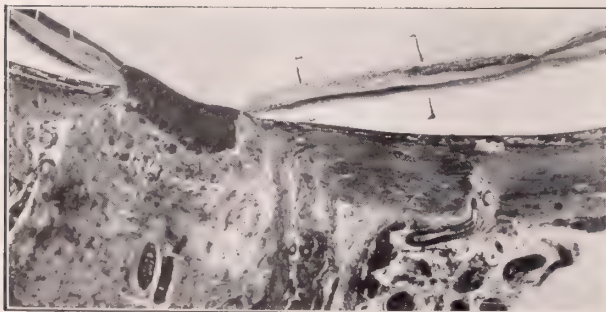


FIG. 4. AS FIG. 2: SEC. NO. 38: SCHNABEL'S CAVERNOUS  
DEGENERATION; AREA OF DEGENERATION OF GANGLION  
CELLS AND MACULAR REGION ON THE RIGHT; DENSE  
COAGULUM IN THE GLAUCOMATOUS EXCAVATION  
AND ON THE NASAL PART OF THE RETINA.

## ESSENTIAL ATROPHY OF THE IRIS. FEINGOLD'S CASE



FIG. 5. ZEISS APOCHROM. 8 MM., WITH LEITZ PROJECTING EYE-PIECE NO. 2; X 98; PORTION IN BRACKETS OF FIG. 4. DEGENERATED SWOLLEN GANGLION CELLS, PARTLY DISPLACED INTO INNER NUCLEAR LAYER.

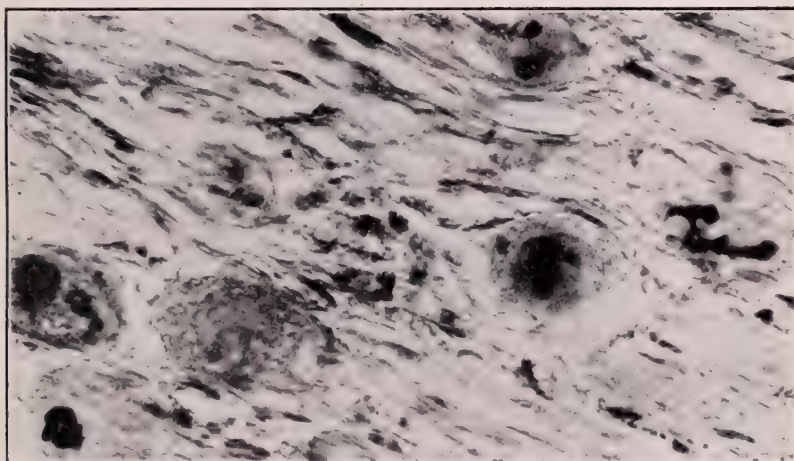


FIG. 6. ZEISS APOCHROM. 2 MM., OIL IMMERSION WITH COMPENSATING EYE-PIECE NO. 4. X 590. SEC. NO. 22. PHOSPHOTUNGSTIC ACID HEMATOXYLIN. NUCLEI OF GANGLION CELLS RESEMBLING THE NUCLEI OF LEUCOCYTES OR MITOTIC FIGURES.





# LUXATION AND AVULSION OF EYEBALL DURING BIRTH.

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Brief abstract of twenty-nine cases from the literature; with report of a case of complete luxation, with operative restoration of the globe and complete recovery. The result after two years is shown by the illustration.

In 1905 Bruno Wolff published a monograph on the "Injuries of the Eyes of Infants During Birth" (*Beiträge zur Augenheilkunde*, Hirschberg Festschrift, 1905, p. 311). These cover a wide range from such slight injuries as produce retinal hemorrhages, to such severe ones as complete separation of the eyeball from the orbit. The classification of injuries is made according to whether birth was spontaneous or instrumental and according to the presentation. Among the cases he has collected there are some of luxation, and some of evulsion of the eyeball. In luxation the eyeball has been forced through the palpebral fissure and lies in front of the eyelids. In evulsion the eyeball is torn out of the orbit. Birch-Hirschfeld reduces Wolff's cases under these headings to fifteen. These are the cases that are given in the accompanying list, together with three additional ones collected by Birch-Hirschfeld.

## CASES FROM SPONTANEOUS DELIVERY.

Case 1. Hoffman (*Monatsch. f. Geburtsch.*, v. 4, 1854) reports a case where the right eye was torn out of the socket, hanging by only the inferior rectus. The mother had received a large dose of ergot. In a subsequent delivery with forceps a similar accident occurred (see Case 15). The mother died after her fourth delivery, and a post-mortem examination showed abnormal pelvic measurements with a very prominent and sharp-edged promontory.

Case 2. Bock (*Centralbl. f. pr. Augenh.*, 1902, p. 12). Difficult labor. Right eye in front of lid, conjunctiva torn, cornea hazy, muscles of eyeball torn. Eyeball replaced, but panophthalmitis set in and infant died. Bock was of the opinion that the orbit had been

mistaken for the rectum and injured by the examiner's finger.

Case 3. De Wecker (*Ann. d'Ocul.*, v. 116, 1896). The same mistake as mentioned above occurred, through the pressure of the examiner's finger, and at birth the left orbit was empty.

Case 4. Wicherkiewicz (*Postep. ocul.*, 1904). Difficult labor. Right eye found in front of lids, held by the external rectus alone. The eye was removed.

## CASES FROM FORCEPS DELIVERIES.

Case 5. Redemans (*Ann. d'Ocul.*, v. 27, 1852). High forceps. Two hours after birth, right eye in front of lids. Marked hemorrhagic infiltration of lid. Panophthalmitis.

Case 6. Snell (*Trans. Ophth. Soc., United Kingdom*, 1903). High forceps. Left eyeball torn out of orbit hanging by shreds of tissue. Marks of forceps above left orbit. Partial facial paralysis.

Case 7. Thomson and Buchanan (*Trans. Oph. Soc., United Kingdom*, 1903). High forceps. Left eye lying on cheek, held fast only by conjunctival tissue and the external rectus. Deep impression by forceps over the frontal and parietal region. Mother, aged 38, primipara, contracted pelvis. Very large fetal head. Symphysiotomy and repeated applications of forceps required.

Case 8. Dittrich (*Wien. klin. Woch.*, 1892). High forceps. Luxation of right eyeball, lower lid torn at inner canthus, all muscles excepting external and internal recti torn. Cornea cloudy, fracture of frontal bone. Infant died.

Case 9. Maygrier (*Leçons de Clin. Obst.*, 1893). Forceps. Eye completely severed by fragment of bone from fractured roof of orbit. Child died.

Case 10. Shukowski (*From Mels*

Jahresb., 1902). Forceps. Eyeball hanging on cheek. Fracture of roof of orbit with orbital hemorrhage. Infant died of meningitis.

Case 11. Coccus (Leipzig, 1870). Luxation without apparent tearing of muscles. Reposition unsuccessful. Child died in 14 days. P. M. showed fracture of orbital roof with dislocation of bone fragments.

Case 12. Sidler-Huguenin (Correspondenzbl. f. Schweiz. Aerzte, 1903). Patient an adult with history of forceps delivery. Left eye luxated in front of lids. Eye blind from optic atrophy and retinal lesions.

Case 13. Steinheim (Centr.f.Augenh., 1879). Forceps. Marked impression on left frontal region. Left eye in complete luxation. Cornea hazy. Eye replaced, followed by panophthalmitis and phthisis bulbi.

Case 14. Beaumont (Trans. Oph. Soc. U. K., 1903). Luxation. Eyeball replaced. Transient corneal opacity. Forceps delivery. The blade of the forceps had acted like the speculum used in dislocating the eyeball in the operation of enucleation.

Case 15. Hofmann (same patient as in Case 1). Low forceps. During attempt to unwind cord caught around the neck, the eyeball glided out between the fingers of the operator. Child died during first day. Hemorrhage intracranial and fracture of orbital roof on both sides.

Case 16. Zangarol (Thesis, Paris, 1864). Low forceps. Complete avulsion. Eyeball found among bed linens. Fracture of roof of orbit.

Case 17. Gueniot (Rec. d'Opht., 1875). Forceps. Complete avulsion, all muscles torn off as well as optic nerve. Child died in three hours. Fracture of roof of orbit and outer wall.

Case 18. Gad (Ophth. Rev., 1906). Forceps. Narrow pelvis. Eyeball held only by fragments of conjunctiva and bits of muscles. Optic nerve severed; fracture of roof of orbit.

Case 19. Eskenarzi (Constantinople, 1904, note in Nagel Jahr.). Luxation. Details not accessible.

Case 20. Bugge (Norweg. Tidskr., 1906, see Nagel Jahr., 1907). Right eye

complete luxation. Labor not difficult. Eyeball replaced. Child died within 24 hours.

Case 21. Hermitte and Salva (Dauphine, 1906, see Nagel Jahr., 1906). Spontaneous luxation of eye following application of forceps in contracted pelvis.

Case 22. Fage (Arch. d'Opht., 1907) saw an infant three days after birth: Complete luxation of eyeball; cornea dry and exfoliated. Reduction of luxation by external canthotomy; after six months large leucoma. In this case, no forceps had been used in delivery.

Case 23. Thomson and Buchanan (Ophthalmoscope, 1907). Difficult forceps delivery, eyelid torn, internal rectus scarred, luxation of eyeball.

Case 24. Turnbull (Brit. Med. Jour., v. 2, 1909). Contracted pelvis, long labor. High forceps. Right eye found on cheek, optic nerve severed. No marks of forceps. Eyeball removed and child recovered.

Case 25. Donaldson (Brit. Med. Jour., v. 1, 1910). Forceps delivery. Left eye lying on cheek and was replaced. Child seen when three years of age, eye appeared normal and sight good.

Case 26. Mills (Brit. Med. Jour., v. 1, 1910). Forceps delivery. Right eye lying on cheek was replaced, but child was dead.

Case 27. Kraus (Muench. med. Woch., 1913). Contracted pelvis, forceps delivery. Right eyeball luxated and replaced. Subsequent enucleation found necessary, when it was found that the optic nerve and all the muscles except the obliques had been severed.

Case 28. Polliot (Clin. Opht., 1914. Reviewed in Ophth. Year Book, v. 11) reports a case in which the eye of the infant was completely enucleated by the finger of the midwife, who was under the impression that she was dealing with a breech presentation and exploring the anus.

Case 29. Goldwasser (Beitr. z. Geburtsch. and Gyn., 1914) reports a medico-legal case in which Prof. Doederlein was called as expert. Avulsion occurred during instrumental delivery and the eyeball was found in the placenta.

#### AUTHOR'S CASE.

The writer desires to report the fol-

lowing case which came under his observation:

Case 30. On August 25, 1913, he was called to see a female infant which had been born one and a quarter hours before. The attending physician stated that the fetal head had been in occipito-anterior position, that labor had been very difficult with a rigid os, and that after a long wait he had been obliged to apply high forceps. At birth, he noted that the left eye was exposed, and he feared that there was congenital absence of the eyelids.

On examination, the writer found a deep impression made by the forceps over the left frontal region and reaching down to the orbit. The left eyeball was completely luxated, but appeared otherwise normal; the eyelids were closed behind the eye.

Efforts to reduce the eyeball by gentle pressure and by means of a lid elevator were wholly unsuccessful; the palpebral fissure was too small. An incision was therefor made at the outer canthus and then reduction was easy. Sutures were placed to close the incision, but the eye was not otherwise dressed. The sutures were removed in a few days. On Sept. 29, the eye appeared normal.

On November 8, 1915, the child was examined carefully, when it was a little over two years of age. The eyeball appeared quite normal. The eyegrounds were healthy, there was no evidence of atrophy of the nerve or of lesion to the retina. The ocular movements were perfect and such tests as could be made, indicated that the sight was good. A photograph of the child made at this time is seen in Fig. 1.

The favorable outcome of this case makes it quite exceptional, and is in part due to the early reposition of the eyeball, within two hours of delivery,—and before there was desiccation and clouding of the cornea.

The marks of the forceps in this case made it evident that the luxation was produced as suggested by Beaumont, just as it is brought about by the speculum during enucleation.

The frequency of luxation and evulsion during birth is difficult to determine with accuracy. The accident is undoubt-

edly rare in spontaneous delivery. Birch-Hirschfeld (*Graefe-Saemisch Handbuch*, 2nd Ed., v. 9), points out however that while more frequent in instrumental delivery, the most severe cases have occurred when no forceps were used. In several of these cases, however, the injury was due to the finger of the examiner, who mistook the orbit for the rectum.

In a number of cases the infants die from the severity of the head injury. In some cases the eyeball, after reposition, was destroyed by panophthalmitis. There are few cases in which the eye



Fig. 1.—Friedenwald's case of luxation of eye ball during birth. Patient more than two years old showing complete recovery.

was saved, and in these there were corneal opacities. The case reported by the writer is an exception to this rule.

The subject is comprehensively dealt with not only by Wolff and Birch-Hirschfeld who have been cited, but also by Wagenmann in the chapter on injuries of the eyeball (*Graefe-Saemisch*, 2nd Ed., v. 9). They advised that, when reposition of the eyeball is considered, any fragments of bone due to fracture of the orbit be first removed. If necessary the Kroenlein operation should be performed to remove them or collections of blood which interfere with reposition. He also emphasizes the necessity of canthotomy.



The subject has also been discussed by obstetricians. Stump (Winckel's Handbuch, v. 3, p. 491) considers the responsibility of the obstetricians. Gold-

wasser (Beitr. v. Geburtsch. und Gyn., v. 63, p. 1423), declares that the obstetricians should not bear any blame when forceps have been used.

## ANEURISMS OF THE RETINAL ARTERIES

BY

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Description of a case with colored plate showing the ophthalmoscopic appearances presented.

Mr. T. K., aged 21, had defective vision of the left eye and was referred to me Jan. 12, 1917, by Dr. W. F. McNary of East St. Louis. The patient first noticed this defect about two months ago and said it could not have been longer for the reason that he had played ball all summer and while at bat had to see the ball with his left eye as it came from the pitcher.

The young man is short and stockily built and appears in perfect health. He has a younger brother aged 14 who is a typical albino.

**PHYSICAL EXAMINATION.** The urine shows no trace of sugar or albumin. There is a slight hypertrophy of the heart but no murmur. The blood pressure is 135. The Wasserman reaction is negative. Vision of the right eye is 6/6; that of the left eye 3/60. The defect of vision is central, the scotoma covering 10 degrees on all sides of the macula lutea.

**OPHTHALMOSCOPIC FINDINGS.** The right fundus is normal in all respects. The left fundus presents a remarkable picture. (See Pl. IV.) The optic disc is normal. In the macular region is a large collection of dots, spots and lines of brilliant white arranged in a circle around the macula lutea. A short distance on the temporal side are more white dots and spots arranged in a semi-circle. The appearances just described suggest an albuminuric retinitis or a retinitis circinata. Near the disc the retinal veins are of normal size but further on the lower ones enlarge suddenly to twice their normal size; while those above narrow almost to threads and then abruptly widen again. The extraordinary character of the picture is evident

as the course of the retinal arteries are followed. The artery going directly downwards passes over a soft white, cloud-like opacity with small hemorrhages below it, and as it crosses an old hemorrhage gives off a fine branch at the very beginning of which is seen a small aneurism.

Just below this point on another branch are five aneurisms—two small and three large ones, and on the main stem one small and one large one. An artery running down and out below the macula region has a small aneurism on a branch and a large one on the main stem. The inferior nasal artery has four large and one small aneurism. Just above the three larger ones is a soft white opacity. Far up in the superior portion of the fundus on branches of the superior nasal artery are two large aneurisms. On a branch of the superior temporal artery is a large aneurism near three small hemorrhages, and above these are three soft white patches in the retina lying beneath the small arteries.

In all there are eighteen aneurisms, the larger ones having a bright central reflex. The difference in appearance between a hemorrhage and an aneurism is well shown in the upper portion of the fundus.

The patient was under observation for three months without noticeable change. On Oct. 11, 1917, nine months after the first observation, the patient called at my request for a final examination before closing this report. The changes noted were as follows: the white spots and patches in the macula region are fewer in number and the radiating figure is much



ANEURISMS OF THE RETINAL ARTERIES JENNINGS' CASE.





less marked. Extending out in both directions just below the disc is a long band of small white dots that I had not observed before. The first and second aneurisms on the inferior nasal artery have coalesced into a sacculated or sausage like enlargement. The small aneurism on the first branch of the artery run-

ning downward is much larger than it was and several of the aneurisms below this point are concealed in a whitish exudation.

The etiology of this rare condition is obscure. Probably it is the result of local inflammation and degeneration of the walls of the retinal vessels.

## PRIMARY SYPHILIS OF PALPEBRAL CONJUNCTIVA

BY

EDWARD E. MAXEY, M. D.

BOISE, IDAHO.

Report of a case affecting the inferior fornix; with tabulation of the cases of chancre of the lids and conjunctiva reported since January, 1900, with bibliography.

A casual examination of the literature convinced me that chancre of the conjunctiva was by no means a common condition, which prompts me to report a case occurring in my practice recently, and also to give you the benefit of my survey of the literature on this subject. For obvious reasons I have not attempted to search the literature farther back than January 1, 1900.

According to Ginzburg (28) the first reported case of primary lid chancre was reported by Ricord in 1850. Many cases have been reported since then, but just how many I am unable to determine from the literature and help at my disposal. I know of no one who has attempted to make a complete compilation of all recorded cases of eye chancre, and those giving any extensive compilation vary greatly in their estimates of the number of cases reported.

In 1904, Terrien (80) made the statement that there were at that time scarcely more than twenty cases of conjunctival chancre known. Ginzburg (28), in 1910, was able to find in the Russian literature alone about 210 cases of primary lid chancre and 27 cases (28 including case reported by him at that time) of primary syphilis of the conjunctiva. In 1915, Finlay (19), in the literature at his disposal, was able to find about 100 cases of palpebral syphilis, and from different writers the total summing up of cases, he said, seemed to be near 500. Wolfrum and Stimmel (77), in

1910, report two cases of primary syphilitic affection of the conjunctiva and make the claim that their cases make a total of 71 cases of conjunctival chancre reported.

Spratt (71), in 1913, reports a most interesting and rare case of lues of the bulbar conjunctiva. In his review of the literature he was able to find only 21 cases of lues primarily affecting the bulbar conjunctiva, his own case making 22. Of these only three were located at the limbus. I have been able to add 14 additional cases of bulbar chancre to those cited by Spratt.

Quoting from Rouvillois (63), Spratt says the relative frequency in which the structures of the eye may be primarily involved are: (1) the lid margin, (2) skin of lid, (3) palpebral conjunctiva, (4) culdesac, (5) bulbar conjunctiva (scleral portion, inner angle and caruncle), (6) limbus and cornea. If we keep in mind the fact that from six to seven per cent (Spratt) to nine or ten per cent (Fournier, cited by Spratt) of all primary lesions are extragenital, and, further, that in frequency of attack the eye ranks after the lip and finger (Alter) (1), or after the lip, breast, mouth, finger, hands and tonsils (Muncheimer, cited by Alter), with chancre of the culdesac or fornix ranking fourth in frequency of the eye chancres, we may arrive at a fairly accurate idea of the relative infrequency of primary lues of the fornix.

In the literature for the past 17 years I have been able to find only three cases of chancre of the inferior fornix (Mathewson) (47), Wolfrum and Stimmel (77), and Suda (72), and three of the superior fornix (Fischer-Galati) (20), Ormond (52) and Pannunzio (53) reported. There may be others among those classified as "indefinite," where the title is obscure or the article not available for review, but probably not many are improperly classified.

My patient, a dentist, age 23, unmarried, came to me October 3, 1916, with, as he explained, "a badly infected eye," and the following history was elicited: On September 5th he gave the anesthetic for a doctor associate who was doing a tonsillectomy on a young woman of easy virtue, several times assisting in swabbing out the throat and mouth of patient. Patient has an indistinct recollection of rubbing his eye at completion of operation, but he does not remember that the patient coughed into his face, but this might have happened.

On or about the 25th of September he noticed an itching sensation in right eye and the following morning there was a slight redness of conjunctiva which continued for five or six days without other noticeable symptoms. Then was noticed a slight mucopurulent discharge, sufficient to make it an appreciable effort to open the eye of mornings. About this time he also noticed a slight soreness and foreign-body sensation in the eye, and from day to day the redness increased, the conjunctiva became edematous, the lower lid more and more swollen, and finally the preauricular and submaxillary glands began to enlarge and become tender.

Prior to consulting me the treatment had been frequent irrigations with boric acid solution, cold compresses, and one application of nitrate of silver solution, strength not known, immediately neutralized with salt solution.

The patient's personal and family history were negative. On his first visit I found the lower lid greatly swollen and indurated, the palpebral and bulbar conjunctiva deeply congested and chemotic, fully half the cornea being covered by the overhanging edematous conjunctiva. The

upper lid was moderately swollen but not indurated, the cornea was clear and unaffected, and the media, iris and fundus were unchanged. The right preauricular gland was as large as a small hen-egg, and the submaxillary and subauricular glands were almost as large, and all were tender on palpation.

On evertting the lower lid I found a shallow ulcer, 4 by 8 mm in area, at juncture of middle and external thirds of deepest portion of inferior fornix, limited entirely, however, to the palpebral conjunctiva. The ulcer was covered with a dark grayish membrane. There was a limited amount of photophobia and lacrimation, a slight mucopurulent discharge, and pressure elicited a moderate degree of soreness in the indurated lower lid, but there was little or no pain in the lid or indurated glands if undisturbed. The temperature and pulse were normal. Smears from surface of ulcer and neighboring conjunctiva showed no pathologic organisms, but the spirochetes were not specifically searched for at this time.

The above history as to probable method of infection was not obtained until after he had been under observation in hospital for about a week, during which time the ulcer was thoroughly cauterized, but there had been no response to treatment during this time, and it was not until this time that I began to strongly suspect we were dealing with a chancre. Scrapings from the ulcer area were again examined, this time particularly for spirochetes, but the laboratory report was again negative, and October 12 Wassermann was also negative. On October 19 a second Wassermann was reported "doubtful," but the third Wassermann, made November 2, was three plus positive, and on this date also the secondary symptoms began to appear on the skin and in the throat, with loosening of hair of scalp and eyebrows.

All doubt as to diagnosis was now cleared up and on the following day salvarsan was administered intravenously, followed by mercurial rubs and other antiluetic treatment. Within 48 hours after administration of salvarsan the conjunctiva began to clear up, the induration of lower lid and glands gradu-

ally receded, and the secondary symptoms soon disappeared entirely. After three weeks of specific treatment the patient passed from observation. The eye at this time was not entirely normal, there being still a slight amount of induration in lower lid at site of healed chancre, some hyperemia of conjunctiva, and the glands though very markedly reduced were still palpable. I know nothing of his subsequent history but presume that he is under the care of his associate physician.

The fact that the specific organism of syphilis was not demonstrated in the palpebral lesion is probably due to the previous cauterization or, possibly, to faulty technic. A thorough search was made for other possible points of invasion but the genitalia and all other parts of the body, except the eye, were entirely free of suspicion. This, with the specific character of the eye lesion, the adenopathy, the characteristic throat and skin lesions, the falling hair, and the final three plus positive Wassermann, make the diagnosis, in my opinion, unquestionable.

The cases of chancre of the eye found reported in the literature since January 1, 1900, are given below. The figures give the footnote references to literature, then follows the name of author and part of eye affected:

Reporter.	Location.
1. Alter.....	Conjunctival, lower lid
2. Abramitzew.....	Eye, indefinite
3. Aubineau.....	Conjunctiva, indefinite
4. Balzer, Boyé and Condoure.....	.....
5. Bielski, G.....	Conjunctiva, upper lid
6. Botteri.....	Plica and tarsus
7. Bourgeois.....	Bulbar conjunctiva
8. Cameron.....	Bulbar conjunctiva
9. Cange, A.....	Lid, indefinite
10. Cauvin, P.....	Lid
11. Collins, E.....	Lid
12. Dandois.....	Bulbar conjunctiva
13. Danlos and Dehévain.....	Lid
14. Davis, A. E.....	Lid
15. DeSchweinitz, G. E.....	.....
16. Del Castillo Quartiellers.....	Conjunctiva and cornea
17. Duboucher.....	Palpebral conjunctiva
18. Dmitrieff.....	Lid
19. Finlay....	Lid, both ext. and int. canthi.
20. Fischer-Galati.....	Superior fornix
21. Forshaw, W. J.....	Conjunctiva
22. Fromaget, H.....	Bulbar conjunctiva, 3 cases
23. Frugieule, C.....	Conjunctiva

Reporter.	Location.
24. Fumagalli, A.....	Border of upper lid
25. Galati.....	Conjunctiva of upper lid
26. Gaucher and Audebart.....	Upper lid
27. Gellé.....	.....
.....	Double conjunctiva and nasal fossa
28. Ginzburg, J.....	.....
.....	Conjunctiva and lower lid margin
29. (?) Cited by Ginzburg, J.....	Upper lid
30. Gilbert.....	Inner angle
31. Ginzburg, T. I.....	Lid
32. Grandclement.....	"Large angle" of eye
33. Gutzeit.....	Bulbar conjunctiva
34. Hallopeau and Trastour.....	.....
.....	Lower lid following a cut
35. Hallopeau and Raillet.....	Lower lid
36. Koupliansky.....	Palpebral conjunctiva
37. Krajsky.....	Upper lid
38. Leoz, G.....	Lid
39. Livingstone and McGregor.....	Lid
40. Luzzati.....	Bulbar conjunctiva
41. Maggi, F.....	Lid
42. Matsuoka.....	Conjunctiva
43. Marbaix.....	Lid
44. Marlow, F. W.....	Conjunctiva
45. Maslennikoff.....	.....
.....	Bulbar conjunctiva at limbus
46. Maslennikov.....	Lower lid
47. Mathewson.....	Conjunctiva, inferior fornix
48. Merle, P.....	Conjunctiva
49. Mewborn, A. D.....	Conjunctiva of lower lid
50. Mine.....	Conjunctiva of upper lid
51. Morax.....	Bulbar conjunctiva
52. Ormond, A. W.....	.....
.....	Retrotarsal fold, upper lid
53. Pannunzio.....	Superior fornix
54. Pandelescu.....	Conjunctiva
55. Passetti, G.....	Multiple of lid
56. Pelissier, R.....	Bulbar conjunctiva
57. Poli, G.....	Upper lid
58. Pons y Marques....	Bulbar conjunctiva
59. Posey, W. C.....	Lid
60. Rollet, E.....	Bulbar conjunctiva
61. Rollet and Grandclement.....	.....
..	Lower lid, infant, probably congenital
62. Rosenbaum....	Ciliary border, both lids
63. Rouvillois, H.....	Bulbar conjunctiva
64. Sans Blanco.....	Bulbar conjunctiva
65. Sauvineau.....	Bulbar conjunctiva
66. Seeligsohn.....	Lid
67. Shetskiy.....	Lower lid
68. Shoemaker, W. T.....	Lid
69. Snitowsky.....	Conjunctiva, upper lid
70. Sourdille, G.....	Bulbar conjunctiva
71. Spratt....	Bulbar conjunctiva at limbus
72. Suda.....	Lower fornix
73. Treacher Collins.....	Conjunctiva
74. Tschistjakow.....	Upper lid, eye angle
75. Vasquez, E. L.....	Bulbar conjunctiva
76. Villemonte de la Clergerie.....	.....
.....	Bulbar conjunctiva
77. Wolfrum and Stimmel.....	.....
.....	Conjunctiva, inferior fornix
Second case.....	Conjunctiva, indefinite
78. Yudin, K. A.....	Palpebral conjunctiva
79. Zirm.....	Eyelids

Summarizing these cases we find that



of the 82 cases reported in this period, 49 may be classed as conjunctival chancres, 27 as lid chancres, 4 are found at the canthus, 1 as chancre of eye, location not known, and 1, perhaps, should be excluded entirely as it may possibly have been congenital. Of the conjunctival chancres, 5 were of the upper lid, 3 of superior fornix, 3 of lower lid, 3 of inferior fornix, 3 of lid, but location indefinite, 21 of the bulbus, 1 of plica and tarsus, and 10 were indefinite as to part of conjunctiva affected. Of those classed as lid chancres, 4 affected the upper lid, 4 the lower lid, 2 the ciliary border and 17 were of indefinite location. All of the 4 cases of angle chancre were at the

inner canthus, though Finlay's case of double chancre affected both canthi.

In the preparation of this paper I have been impressed with the value to students of our specialty of the Ophthalmic Year Book, and also with the fact that those who write papers or report cases should use more care in selecting their titles. Chancre of the eye, or even chancre of the conjunctiva, of course, is getting close, but such titles are rather discouraging to one who is trying to tabulate lesions of the different structures of the eye. There are too many "indefinites" in the above tabulation to permit my effort being classed as a complete compilation for the period named.

### BIBLIOGRAPHY.

1. Alter: Ophthalmology, January, 1916.
2. Abramitzew: Cited by Ginzburg, J., see 29 below.
3. Aubineau: Ann. d'oculist, Paris, 1907, CXXXVIII, 16-21.
4. Balzer, Boyé and Condouze: Bull. Soc. Fr. de Derm. et de Syph., 1908, XIX, 339.
5. Bielski, G.: Vest. Oftalm., Odessa, 1911, XXVIII, 593.
6. Botteri, A.: Klin. Monats. f. Augenh., April, 1909, 425.
7. Bourgeois: Clin. Ophtal. Paris, VII, 229.
8. Cameron: Northwest Medicine, Vol. 15, page 328.
9. Cange, A.: Arch. Gen. de Med., 1915, I, 1428-37.
10. Cauvin, P.: Arch. d'Opht., Paris, 1909, XXIX, 612-623.
11. Collins, E.: Polyclin. (Lond.), 1902, VI, 403.
12. Dandois: Rev. Med. de Louvain, 1909, 209-216.
13. Danlos and Dehévain: Bull. Soc. Fr. de Derm. et de Syph., 1906, XVII, 149.
14. Davis, A. E.: Anal. de Oftal., Mexico, 1904-5, VII, 404.
15. DeSchweinitz, G. E.: Tr. Sec. Ophth. Coll. Phys., Phila., 1910, p. 108.
16. Del Castillo Quartielliers: Semana Med., Buenos Aires, 1904, XI, 1356.
17. Duboucher: Bull. Med. de L'Algérie, 1908, XIX, 542.
18. Dmitrieff: Cited by Ginzburg, J., see 29 below.
19. Finlay: Arch. of Ophth., July, 1915.
20. Fischer-Galati: Zeitsch. f. Augenh., 1913, XXX, 326.
21. Forshaw, W. J.: Brit. Med. Jour., London, 1905, II, 952.
22. Fromaget, H.: Jour. de Med. de Bordeaux, 1911, XII, 615.
23. Frugiuele, C.: Gior. d. Assn., Napol. di Med. e Nat., Napoli, 1901, XI, 3, 129.
24. Fumagalli, A.: Cong. d'Assn. Aftal. Ital., 1902, Pavia, 1903, XVI, 122.
25. Galati: Zeitsch. f. Augenh., Berlin, 1913, XXIX, 326.
26. Gaucher and Audebert: Bull. Soc. Fr. de Derm. et Syph., XXIV, 170.
27. Gellé: Arch. Intern. de Laryng. etc., Paris, 1904, XVII, 417-420.
28. Ginzburg, J.: Centralbl. f. prak. Augenheilk., 1910, XXXIV, 129.
29. Cited by Ginzburg, J. See 29 above.
30. Gilbert: Ann. de Therap. Derm. et Syph., 1902, II, 145-169.
31. Ginzburg, T. I.: Vestnik Oftal., Moscow, 1906, XXIII, 319.
32. Grandclement: Lyon Med., 1905, CV, 224.
33. Gutzeit: Arch. f. Dermat. u. Syph., Vienna, 1904, LXIX, 349-362.
34. Hallopeau and Trastour: Ann. des Dermat. et Syph., Paris, 1900, 4. S. I., 1153.
35. Hallopeau and Railliet: Bull. Soc. Fr. de Derm. et Syph., Paris, 1907, XVIII, 394.
36. Koupiansky: Paris Thesis, 1913.
37. Krajsky: Cited by Ginzburg, J. See 29 above.
38. Leoz, G.: Siglo Med., Madrid, 1905, LII, 283.
39. Livingstone and McGregor: Lancet, May 20, 1916, p. 1041.
40. Luzzati: Ann. de Med. Navale, Rome, 1913, XIX, 601.
41. Maggi, F.: Clin. Ocul., Palermo, 1903, p. 1513.
42. Matsuoka: Nippon Gank. Zashi. May, 1916.
43. Marbaix: Soc. Belge d'opht., No. 34, p. 86.
44. Marlow, F. W.: Ophthalmic Record, Chicago, 1904, XIII, 113.
45. Maslennikoff: I.: Vrach, Gaz., St. Petersburg, 1901, VIII, 825.

46. Maslennikov: Cited by Ginzburg, J. See 29 above.
47. Mathewson, G. H.: Ophthalmic Record, 1915, XXIV, 342.
48. Merle, P.: Ann. d. Mal. Bluer. Paris, 1909, IV, 267.
49. Mewborn, A. D.: Jour. Cutan. Dis., New York, 1905, XXIII, 167.
50. Mine: Nippon Gank. Zashi., November, 1914.
51. Morax: Clin. Ophthal., Paris, 1900, VI, 83.
52. Ormond, A. W.: Tr. Ophth. Soc. United Kingdom, London, 1900-01, XXI, 3.
53. Pannunzio: Arch. d. Oftal., Jan., 1914.
54. Pandelescu: Spital., Bucaresci, 1912, XXXII, 336.
55. Passetti, G.: Ann. d. Ottal. Pavia, 1911, XL, 507.
56. Pelissier, R.: Monograph, Lyon, 1904.
57. Poli, G.: Ann. d. Ottal. Pavia, 1911, XI, 107-112.
58. Pons y Marques: Arch. d. Oftal. Hispano-Am., Barcelona, 1913, XIII, 1-3.
59. Posey, W. C.: Ophthalmic Record, Chicago, 1902, XI, 136.
60. Rollet, E.: Rev. Gen. d. Opht. Paris, 1904, XXIII, 97-104.
61. Rollet and Grandclement: Lyon Med., 1911, CXVII, 651.
62. Rosenbaum: Ophthalmic Record, Chicago, July, 1916, p. 339.
63. Rouvillois, H.: Rev. Gen. d. Ophth., Paris, 1909, XXVIII, 289.
64. Sans Blanco: Arch. d. Oftal. Hispano-Am., 1901, I, 32.
65. Sauvineau: Ann. d'Oculist. Paris, 1906, CXXXV, 390-395.
66. Seeligsohn: Verk. d. Berl. Opht. Gesellsch., Leipzig, (1905), 1906, p. 8.
67. Shetkiy: Russk. J. Kozhn. I. Ven. Bolirzn. Kharkov. 1904, VII, 606.
68. Shoemaker, W. T.: Annals Ophth. (St. Louis), 1911, XX, 444, also p. 544.
69. Snitowsky: Russk. Vrach., 1910.
70. Sourdille, G.: Arch. d. Opht., Paris, 1900, XX, 113.
71. Spratt: Jour. A. M. A., 1913, LXI, 1179.
72. Suda: Nippon Gank. Zashi, June, 1910.
73. Treacher Collins: Royal Lond. Hosp. Reports, 1904, V. XVI, 16.
74. Tschistjakow: Cited by Ginsburg, J. See 29 above.
75. Vasquez, E. L.: Rev. Med. d'Sevilla, 1908, LI, 353.
76. Villemonte de la Clergerie: Arch. d'Opht., Paris, 1910, XXX, 43.
77. Wolfrum and Stimmel: Zeitsch. f. Augenh., Berlin, 1910, XXIV, 141-150.
78. Yudin, K. A.: Zeitsch. XXIII, 162.
79. Zirm, E.: Centralbl. f. Prak. Augenh., Leipzig, 1901, XXV, 85.
80. Terrien: Progr. Med., 1904, XX, 145.

## CYST OF DURAL SHEATH OF OPTIC NERVE

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Report of case, including operative removal. Subsequent result, and histologic study of the removed tissue. With illustrations showing the condition before and after treatment. Read before the Colorado Ophthalmological Congress, August 9th, 1917.

On May 25th, 1914, L. B., a lad of six years, was brought to me with a history of having had frequent attacks of frontal headache during the previous six weeks.

Vision with the right eye was normal, media clear, fundus healthy. There was one diopter of hyperopia. Vision with the left eye was almost nil, the patient, at times seemed to see movement of a hand 40 cm. from the face. Media clear. The optic disc decidedly atrophic and of pearl-white color. Hyperopia = 3D. Left eye-ball unsteady in its movements. Correcting lenses were ordered and the high frequency current used on the eye at intervals for about three weeks, when the treatment was discontinued.

Patient returned Nov. 18th, 1916, when there was marked left exophthalmus. The eye-ball protruded 5 mm. forward, downward and inward beyond the plane of the right eye. By measurement with the exophthalmometer, the right eye was 17 mm. and the left eye 22 mm. out from the planes of the outer orbital margin. Movement of the left eye upward and outward was almost nil. Ophthalmoscopic measurement of the left eye was then +6D., being double that revealed 2½ years previously. Tumor of the optic nerve was suspected and operation advised. An X-ray picture did not reveal any evidence of sinus involvement, or solid tumor in the orbit.

On Dec. 5th, 1916, under general an-

esthesia, a vertical incision about 30 mm. in length and 5 mm. external to the cornea, was made through the conjunctiva and capsule. The external rectus was elevated on a hook, and black silk

the cyst. The optic nerve was then exposed and severed close to ball. A section of the nerve with the cyst wall attached was then removed. The external rectus muscle and conjunctiva were then



FIGURE 1.

Cyst of Optic Nerve Sheath. Bane's case. Front view before operation.

sutures passed through the muscle near its attachment. The muscle was then severed and drawn outward. Dissection backward, close to the eyeball, soon brought into view a smooth, round mass, 12x18 mm., that appeared to be cystic. The growth was firmly attached to the sclera around the optic nerve entrance to the eye-ball, and enveloped the nerve for about 18 mm. toward the optic foramen.



FIGURE 2.

Same case nine months after operation.

stitched back in place, the eye closed, and a compress applied. The eye-ball having been pushed forward during the development of the cyst and the ball flattened antero-posteriorly, the drawing of the ball toward the nose gave ample space for observation and dissection without disturbing the outer orbital wall. There was but moderate reaction from the operation. The stitches were re-



FIGURE 3.

Cyst of Optic Nerve Sheath. Bane's case. Side view before operation.



FIGURE 4.

Same case nine months after operation.

The cyst was easily separated from the surrounding tissues.

While endeavoring to detach the tumor from the sclera it was ruptured and clear fluid escaped, permitting the collapse of

moved on the 6th day. A compress was kept applied for three weeks, to support and encourage retraction of the ball.

Upon omitting the pad and permitting of exposure of the eye, there developed



an ulcer 1x2 mm. on the cornea, near the temporal margin. The ulcer healed in six days, the compress having been resumed. For several months following the operation there was manifest an edematous condition of the tissues where the incision was made. So persistent was the edema, that I entertained the thought that there was an exudate forming in the orbit from some remains of the cyst wall. The edema has disappeared. The blood supply of the retina does not appear to have been disturbed by the severing of the nerve. Possibly collateral circulation was established during the pressure of the cyst contents on the optic nerve. The movements of the eye are yet somewhat limited. The photographs were taken just previous to the operation, and months afterward.

I am indebted to Dr. William C. Fin-noff for the following report of the pathologic findings.

"The specimen included the optic nerve and collapsed cyst wall which surrounds it. The section of the nerve measured 11 mm. in length and 2½ mm. in thickness. The thickness of the specimen which was nearest the globe and included the nerve and its sheaths, measured 1 cm. The posterior portion, 11 mm. from the globe, is 7 mm. in thickness. Specimen fixed in Zenker's fluid and imbedded in celloidin.

Microscopic examination: The optic nerve fibres are atrophic. The septal fibres have not increased in number or in thickness, but seem closer together than normal. There has not been an invasion of the connective tissue into the nerve. The vessel walls have not increased in thickness but are, possibly, a little smaller than normal. The arachnoidal sheath is not thickened; its relation to the nerve is normal, and it is covered only with a single layer of endothelium.

The pial sheath presents a honey-combed arrangement. There are numerous small fibrous cords covered with a single layer of endothelial cells.

The dural sheath is thickened; its inner covering a greatly thickened layer of endothelial cells. This thickened endothelium is more pronounced in the anterior portion of the specimen, and gradually thins to ten or twelve layers of cells in

the posterior portion. The endothelium in the anterior portion fills the space between the pia and dura, and has a whorled appearance. In this thickened endothelium a few blood vessels are seen. They are only endothelial tubes filled with blood. The fibrous portion of the dura is also markedly thickened."

#### DISCUSSION.

MARCUS FEINGOLD, New Orleans. A change of the refraction in the sense of a greater hypermetropia is a characteristic symptom of tumors behind the eye, this change being due to the posterior part of the eye being bulged in.

An interesting point in this case is the fact that the operation caused so little interference with the nerve supply of the cornea in spite of the fact that during the operation the ciliary nerves must have all been cut through. The ulcer described cannot be looked upon as one due to a disturbance in the nerve supply because it occurred at the temporal margin of the cornea while ulcers seen following disturbance in the trifacial nerve are situated in the lower part of the cornea and, above all, it healed in the remarkably short time of six days.

Another point of interest in the case is the cystic nature of the tumor, such conditions being comparatively rare. The tumor is difficult to classify and the microscopic picture reminds one very much of a lymphangioma but it is very difficult to think of such tumors in this locality and we must, therefore, assume that the tumor was derived from the pial and arachnoidal sheaths of the optic nerve.

HAROLD GIFFORD, Omaha, asked if the eye still protruded after the operation. Dr. Bane replied in the affirmative. Dr. Gifford said that it was his experience in such cases that there was a convergent strabismus, from the stretching of the muscles, even where the muscle was not cut off. I do not see how the doctor could have obtained a better result under the circumstances. The operation shows that it is not necessary to do the Kroenlein operation every time you have to go into the orbit. In two cases of cyst of the sheath I have had, in one the eyeball was lost through laceration of the cornea. In these cases where the eyeball protrudes, it might be well to consider the possibility of there being a blood cyst. Have any of the members present had a blood cyst of the orbit? I have had three. On getting in, I found a large elastic mass, which would burst as I was getting ready to remove it, and a lot of blood escape. The first time I closed up (having done a Kroenlein), and the cyst subsequently refilled. The second time I swabbed out with alcohol and got a perfect result with perfect vision. Another case I treated in the same way, and the condition has to some extent recurred, but is not nearly so bad as before the oper-

ation. In another case the tumor was made up of a number of lobules, which were filled with coagulated blood.

EDWARD JACKSON, Denver. I saw Dr. Bane remove the cyst. It was certainly a very interesting condition. One thing that struck me about it was the practically unchanged character of the retinal circulation after the operation. The retinal vessels were not strikingly small and there was apparently no material change in the circulation after the operation. The only explanation I can offer is that under the slow development of the tumor there had been established a collateral circulation.

With regard to the blood cysts which Dr. Gifford refers to, I have seen one case in consultation. One thing about the history puzzled us. The tumor several times appeared to grow smaller for a time, and then increase in size again. We supposed it was a sarcoma in the orbit. The eyeball and the tumor were removed on that supposition. But the tumor was found to consist of some large vessels and a large cavity filled with

blood. Probably the result would have been just as good if the eyeball had been left. I believe such an operation as that described by Dr. Bane would have been perfectly practicable in that case. Perhaps tumors of that character are not quite so rare as the literature would indicate. That would seem to be the case from what Dr. Gifford says about having seen three of them. These blood cysts are so different and require so much less radical an operation, that they ought to be thought of in the presence of a tumor in the orbit.

H. H. STARK, El Paso. I have a case on hand now that this discussion may enlighten me on. The patient has normal vision, and the tumor has grown in the past year or so. I have hesitated to interfere in this case because of the normal vision. I should like to ask Dr. Gifford if the blood cysts had a history of injury.

Dr. Gifford. In neither of the cases.

W. C. Bane, (closing), referred to having found in the literature a report by Eleonskaya of a case of cystic tumor in the optic nerve.

## ADAPTABILITY OF THE PHORO-OPTOMETER STEREOSCOPE FOR THE HAITZ AND BISSELL CHARTS.

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BOSTON.

A description of the instrument and methods for using it with an appendix on the prism diopter and squares for such charts.

In using Haitz charts I at first followed Haitz instructions, using an ordinary Holmes stereoscope marking on the same the distance at which the chart should be viewed. It was soon found that holding the stereoscope was tiresome for the patient, and kept it quite unsteady. As I make constant use of the phoro-optometer I found it was much more satisfactory to make the stereoscope to order for each patient.

I use for each eye  $+5.25$  with the chart at 19 cm. In the ordinary use of the phoro-optometer stereoscope  $+10$  is employed with the cards at 10 cm. This makes each, prism diopter = deviation of 1 mm. With  $+5.00$  at 20 cm., and practically the same at 19 each prism diopter = deviation of 2 mm. With the B3 card the natural fusion distance is determined, and sufficient prism introduced to make lines cross at 8, since Haitz charts have a separation of 8 cm. For example: should the red line cross at

5 this means that 5 cm is the natural fusion distance. To secure the crossing at 8, fifteen diopters more is required since 30 mm more deviation is needed and at 20 cm each prism diopter = 2 mm;  $30 \div 2 = 15$ . If the patient happens to converge, more prism will be needed, the exact amount being determined by turning the rotary prisms. The patient should wear his refractive correction, and if he be presbyopic, his reading glasses, or the necessary amount added to the  $+5.00$ .

The stereoscope is now ideal for mapping a central scotoma, and at the same time it has been demonstrated that the patient has binocular vision sufficient for the test. Since visual acuity is often poor and fusion faculty of low grade, it was found that the lines of the B3 card were too fine to be easily seen by many patients. I have therefore drawn upon the back of the chart a modification of B3 with heavier lines.

In using the Bissell Blind Spot Chart



it is necessary to get a wider field. This is easily obtained by commencing with the +5.25 decentered out 10 mm wider than the patient's P. D. and substituting for the Revolving Prisms, after the necessary amount has been determined, plain prisms from trial case. This increased distance of the lateral part of the chart changes the perfect correspondence of squares to degrees of the arc; the error being  $\frac{1}{4}^\circ$  in the whole size of a normal blind spot but if one wishes to be more exact the chart can be bent by having a third support, so that the ends and the centre will be the same distance away. (See appendix.)

Lloyd's Slate (described in the *Ophthalmic Record*, August, 1917) is a combination of the Haitz and Bissell Charts, and therefore suffices for both purposes. Dr. Lloyd kindly sent me one which I have found very satisfactory. The color of the cross lines is much more subdued than the other charts of American manufacture which I have seen, and is, therefore, less confusing. If one is not fortunate enough to possess the original Haitz, he will find this a decided improvement even for central scotomata, while for the blind spot measurement it shows at a glance the relation to the macula, and the normal area according to Gradle.

The writer suggested to Lloyd and Bausch & Lomb, the making of record slips duplicating the slate. These suffice for recording either central or para-central scotomata or blind spot measurements, for one or both eyes, and always maintain the relative positions. The data suggested by Bissell are printed on the back. One may mark on the slate with chalk as Lloyd suggests and transfer the record later; but I have found it quite satisfactory to have my assistant stand behind the patient—slip in hand—watching the point reached by the object when the patient first sees or first loses it, and mark it immediately on the slip. In this way the permanent record is finished as soon as the test is completed.

Those who do not use the phoro-optometer will probably prefer to get the special wide angle stereoscope (Bausch & Lomb). But the method described does not necessitate the patient's moving from his chair, dispenses with a new instru-

ment and gives one a knowledge of the patient's fusion faculty, which should be investigated before attempting the test. The only expense involved is the central aluminum screen, the cost of which is trifling. Moreover, the writer still lives in hopes that more of his colleagues will recognize the value of the phoro-optometer stereoscope in fusion training and the cultivation of adduction. This adaptability for the Haitz and Bissell Charts is an additional reason for the adoption of this wonderful instrument.

In December, 1916, there was published in the *Journal of Ophthalmology, Otology and Laryngology* a translation of Haitz' description of his charts. Of this there are a few reprints left which will be sent to those desiring them.

## APPENDIX.

### DISTINCTION BETWEEN DEGREE AND PRISM DIOPTER.

The author must protest against the very common mistake of confusing the terms Degree and Prism Diopter: A *degree* ( $^\circ$ ) is  $1/360$  of the arc of a circle, and should be restricted to Perimetry, the measurement of Heterotropia, and Stereoscopic Kampimetry.

The unit of the *prism diopter* is a prism which deflects a ray of light 6 cm. at 6 m. Heterophoria is therefore measured in prism diopters. According to Prentice's rule, (*Ophthalmic Lenses & Prisms*, 1917, p. 49), the prism diopter = tangent of  $34' 22''$ , figured as follows:

Nearest smaller in table is—

$$\text{Tangent } \dots\dots 1\Delta = .01$$

$$\text{Tangent } \dots\dots 0^\circ 30' = .008727$$

---


$$\text{Difference } \dots\dots = .001273$$

Nearest larger in table is—

$$\text{Tangent } \dots\dots 0^\circ 40' = .011636$$

Nearest smaller in table is—

$$\text{Tangent } \dots\dots 0^\circ 30' = .008727$$

---


$$\text{Difference for } 10' = .002909$$

Dividing the whole difference by difference for  $1' =$  minutes to be added to  $30'$ ,  
 $.001273 = 4.37' + 4' 22''$

$$.0002909$$

$$\therefore \text{Tangent } 1\Delta = 0^\circ 30' + 4' 22'' = 34' 22''.$$

A  $1^\circ$  (degree) apex angle prism of glass, index 1.53, deflects a ray of light



31' 48" (Prentice: Ophthalmic Lenses, 1900, p. 108), so that for ophthalmologic purposes the prism diopter has become the prism unit and deflects a ray of light about  $\frac{1}{2}^\circ$  (degree).

#### THE STEREOSCOPIC TANGENT OF $1^\circ$

Haitz has calculated his chart for +5.25 as this is the strength used in the standard stereoscope. At the focal distance 19 cm., this makes each square 3.3 mm. If o. u. + 5.00 is used at 19.8 cm. he says each square is .16 mm. too small. This is easily figured by the principal of similar triangles as shown by Peter (Principles and Practice of Perimetry).

From tables we obtain tangent of  $1^\circ = .017455$ ,

$1 : .017455 = \text{focal distance} : \text{tangent required.}$

$.017455 \times 18.2 = .317681 \text{ cm.} = 3.17681 \text{ mm.} = \text{tangent at } 18.2 \text{ cm.}$

$.017455 \times 19. = .331645 \text{ cm.} = 3.31645 \text{ mm.} = \text{tangent at } 19 \text{ cm.}$

$.017455 \times 19.8 = .345609 \text{ cm.} = 3.45609 \text{ mm.} = \text{tangent at } 19.8 \text{ cm.}$

$.017455 \times 20. = .349100 \text{ cm.} = 3.491 \text{ mm.} = \text{tangent at } 20 \text{ cm.}$

$.017455 \times 21. = .366555 \text{ cm.} = 3.66555 \text{ mm.} = \text{tangent at } 21 \text{ cm.}$

This corresponds exactly with the result obtained above for 19 cm., but the difference between the tangent at 19 cm. and 19.8 cm. is .139 mm. and not .16. Since Haitz says the .16 mm. is "Plainly negligible," this error is of no account. In order to be more exact the author has had made a very perfect pair of +5.25 toric lenses. This takes care of the central measurements at 19 cm., but the most lateral portion of the blind spot is almost 1 cm. farther away, that is 20 cm., at which distance the square is .17 mm. too small. If the blind spot has a lateral diameter of  $5^\circ$  (degree) ( $4^\circ 54'$  Gradle), the whole error would be  $5 \times .17 = .85 \text{ mm.}$  As the square is 3.3 mm.  $.85 = .25^\circ$  (degree). That is, the blind spot would be mapped  $\frac{1}{4}^\circ$  (degree) larger than reality. This is of course too slight to be of any moment, but if one wishes to be more exact the chart can be bent by having a third support so

that the ends will be just the same distance as the center.

#### POINT FROM WHICH TO MEASURE RADIUS

There is one important item about which the author is unable to agree with the authorities and that is the *point from which* this 19 cm. should be measured. Haitz says: "Inasmuch as the focal distance is reckoned from the side of the lens turned toward the slide, the latter is to be brought to such a position that the middle of both pictures stands at about 18.8 cm. *from the bottom of the side of the lens turned toward the nose.*"

Dr. Bissell says: "The card carrier . . . . . should be just within the focal plane of the lenses, at 18.8 cm. In this position . . . . . the rulings of the card have a normal  $1^\circ$  angle if the centre of rotation of the eyes is at 25 mm. from the *anterior* surface of the lenses," but he furnishes no means of obtaining this data. Presumably this means that the lenses should be 13 mm. in front of the corneae, and omitting the question of rotation the 18.8 cm. is measured from the *anterior* surface of stereoscopic lenses.

Dr. Bissell refers to Mr. Max Poser, of Bausch & Lomb, as his authority, but notwithstanding his eminence as a physicist, it is impossible to regard this statement as satisfactory.

In constructing a wide angle toric lens it may be necessary to assume it will stand 25 mm. in front of the center of rotation in order that the aberration may be corrected as the eye turns, but he has adopted Haitz' point from which to measure the radius, namely, the anterior surface of the stereoscopic lenses.

Moreover he furnishes no means of determining the center of rotation, and with a hooded stereoscope it is not possible to observe or measure the distance of the lenses from the corneae, which is the only way of *approximating* the center of rotation.

In constructing a tangent screen Dr. Peter (Ibid.), says that radius is to be measured from the front of the cornea.

<sup>1</sup> Exhibition of a special wide range stereoscope for the Haitz & Bissell Tests. Acad. Ophthalm. & Oto-Laryn., Pittsburgh, Oct., 1917.

## THE NODAL POINT

To be exact it seems to the writer that the *nodal point*, being the point through which pass all rays which enter into the formation of the image, must be the apex of both similar triangles, *and must, therefore, be the point from which to measure radius.*

In the schematic eye this point is usually given as 7.3 mm. for anterior and 7.6 mm. for posterior behind the cornea. The addition of a + 5.25 will carry this point forward, the exact amount depending on the form of the lens and its distance from the eye. If the lens be toric with a base curve of -6.00 and an anterior curve of +11.25, and if it be situated at the standard distance 13 mm. in front of the cornea, the nodal point of the whole system, lens and schematic eye combined will be from 2 to 3 mm. farther forward, approximately 5 mm. behind the cornea.

Thus it appears that the nodal point is about 5 mm. + 13 mm. = 18 mm. back of the stereoscopic lenses. This is practically 2 cm., so that the Haidt chart with the 3.3 mm. square should be placed 19 cm. - 2 cm. = 17 cm. in front of the stereoscopic lenses to secure the nearest approximation to a one degree equivalent.

Reference to the table on page 22 shows this error would make each square 3.66—3.31 = .35 mm. too small. This error would make the normal blind spot  $\frac{1}{2}^\circ$  too large but is easily corrected by adopting 17 cm. as the distance of the chart from the back side of the stereoscopic lenses. This is *equivalent to measuring the radius from the nodal point.*

But this calculation is for a schematic eye. "The nodal points differ in various eyes according to their refractive power and such differences may even exist in two eyes, having the same degree of ametropia, so that punctilious precision as applied to their positions does not seem possible of attainment.

"Besides with the use of a stereoscope there is always an error of parallax incurred due to the nodal point and the point of prism refraction not being made to coincide. This parallax is least when the eye is closest to the apex edge of the prisms; and even were the cornea in actual contact with the prism surface, the nodal point would still not be at the point of refraction of the prism. Hence a discrepancy between the plottings of the scale and the fundus will ever be present through the use of a stereoscope." (Chas. F. Prentice; personal communication.)

It is possible that the improved wide angle stereoscope may eliminate this error of parallax, but until the radius is measured from the nodal point, and the stereoscopic lenses are at a fixed distance, say 13 mm. in front of the cornea, it must be less exact than the phoro-optometer stereoscope.

Perimetry with or without a stereoscope does not correspond exactly with degrees of the retina. However, this limitation does not materially detract from the practical value of stereoscopic perimetry, as the error need never exceed  $\frac{1}{4}^\circ$  (degree) if the 19 cm. be measured from the schematic nodal point of the combined system, and one would hardly presume to diagnose abnormality unless the enlargement of the blind spot were as much as  $1^\circ$  (degree). Moreover, the comparison of successive examinations made under similar conditions will show any change that may have occurred, that is, the error will be constant.

At the present writing the phoro-optometer stereoscope furnishes the most exact means of reproducing similar conditions. The lenses may be brought as close to the lashes as possible without touching, the pupillary distance of the lenses and the exact amount of extra prism exhibited can be recorded.

# MASSIVE SPONTANEOUS HEMORRHAGES INTO THE VITREOUS.

LEIGHTON F. APPLEMAN, M. D.

PHILADELPHIA, PA.

A clinical paper reporting three cases with discussion of etiology and treatment. Read before the Section on Ophthalmology, College of Physicians of Philadelphia, April 19th, 1917.

The consideration of this subject has been prompted by the observation of three cases of this condition in the service of Dr. T. B. Holloway in the Polyclinic Hospital, the details of which I shall relate through his courtesy.

Case 1. Mrs. C. R., aged 40, came under observation on May 23, 1916, with the history of having lost the sight of the left eye six days previously. There was no history of injury. At the time she came to the clinic, there was general conjunctival congestion; the pupil was semidilated; tension was normal; she complained of pains through the eye and was conscious of a cloud over this eye. No view of the fundus was possible owing to a large hemorrhage in the vitreous appearing as a dark cloud which failed to transmit the fundus reflex.

The right eye had vision of 6/6; the disc was irregularly oval; scattered throughout the fundus were small, discrete, yellowish-white spots surrounded by fine, punctate pigment.

She was suffering from an extensive pyorrhea which had existed for a long time, for which she was advised to seek treatment but which she failed to do for about six weeks after being first seen by us. She had had one child, born dead, 11 years ago; since then had three miscarriages. The Wassermann report was negative. The urine showed a few hyalin casts and a light cloud of albumin.

She was given atropin, 1 per cent. solution, and dionin 2 per cent. solution, 1 drop of each to be instilled into the eye three times a day. Under this treatment the congestion of the eye subsided, and the density of the vitreous hemorrhage diminished to such an extent that, about six weeks later, a partial view of the eyeground could be obtained, the disc appearing very pale; the arteries very small, the superior branches of the central artery showing as solid white lines for

about one disc's diameter beyond the disc edges, the lower ones having the same appearance over the disc itself but not beyond. The veins were not engorged. Numerous large hemorrhages were scattered over all portions of the fundus and in the masclar region. Finer details were obscured by the vitreous haze.

One month after the first attack, a second large hemorrhage occurred which obscured all fundus details, although a very faint reflex could be obtained in the peripheral portion above. It was only shortly after the second hemorrhage that she was finally induced to have her teeth treated, the septic absorption from this source being considered the possible cause of her intraocular condition. She was seen at intervals until October during which time, in addition to the local treatment, she was given potassium iodid. Very little change was caused in the intraocular condition, the vitreous when last seen being filled with large opacities, and it was believed that she had been having recurrent hemorrhages.

Case 2. J. L., male, aged 21, came under observation on June 10, 1916, with the statement that he suddenly lost the sight of the left eye two months previously, and could only see daylight. Vision at the time he presented himself was light projection. There had been no previous injury. He experienced no pain, excepting a "jumping" sensation over the eye. He gave a history of chancre one year previously. The right eye was normal; vision 6/6.

Examination showed, in the left eye, that the pupil was dilated and fixed, irregular in contour, with synechia down and out, and pigment spots on the anterior lens capsule. Either on, or just beneath, the posterior lens capsule a large opacity with serrated edges was seen, best by oblique illumination. With the ophthalmoscope, no fundus reflex



could be obtained from all portions. Tension 1. No external evidences of irritation were present.

In the right eye, the pupil reacted to direct light; none to indirect light. The media and fundus details were normal.

The Wassermann reaction proved strongly positive. He received several injections of arsenobenzol, and was given potassium iodid in ascending doses over a period of three months without any material change for the better in the condition of his eye, although his general health was greatly improved.

Six months later he had an attack of iritis in the same eye; this subsided promptly under appropriate treatment, although synechia occurred in spite of dilatation of the pupil because of shallowness of the anterior chamber from the fact that the lens was swollen and was gradually becoming opaque as a result of interference with its nutrition through changes in the vitreous. The tension at this time was slightly raised. When last seen, four spots of atrophy were seen in the upper portion of the iris, showing that ultimately the whole eye would probably become atrophic.

Case 3. F. B., male, aged 27, was first seen on October 27, 1916, having suddenly lost his sight in the left eye three days previously and now had sensations of a veil over the sight. There was no external congestion, and no pain.

The pupils were equal; the right 2 mm., reacted normally; the left 4 mm. reacted very slightly to direct light. The Wassermann reaction proved negative. Examination under euphthalmic mydriasis showed, in the *left* eye, a massive hemorrhage into the vitreous which obscured all details of the fundus and allowed no red reflex except in a small area in the upper part when the eye was rotated strongly upward.

The *right* eye, of which he did not complain, showed evidences of previous trouble, nor did he give any history of previous trouble. The cornea and lens were clear. The vitreous, however, contained two masses of whitish connective-

tissue formation directly opposite to each other well forward, from which prolongations extended backward. The larger was situated in the lower inner quadrant slightly below the horizontal plane, the main body of the mass being continuous backward with the retina, the latter being drawn into elevations or ridges, apparently by tension, and the retinal vessels being continued into the elevated portion. This tension seemed to have been exerted upon the whole retina around the disc and for two disc-diameters to the temporal side as shown by striations or folds in the retinal tissue and by the unusual overlapping of the disc margins as the membrane was drawn towards the nasal side. A thin V-shaped prolongation also extended out into the vitreous from the main body of the mass and ended about midway in the vitreous on a line with the disc. A second mass of connective tissue was seen in the upper outer quadrant, slightly above the horizontal plane well forward. This also sent a free prolongation outwards into the vitreous towards the center. The main body of this mass was also continuous with the retina which was elevated and its vessels continued into the mass, the whole gradually merging into the retina by finger-like projections near the posterior pole. An irregular exudation was also seen just above the disc and to the temporal side. The superior nasal vein showed white streaks as of perivasculitis.

He was admitted to the hospital for study on November 15th. His family history was negative. General health always good. He is the father of two living, healthy children. The lungs and heart normal. Admits having had chancre nine years ago. Urine examination showed no albumin, casts or indican, and in culture showed *Bacillus subtilis*. Blood showed leucocytes 9400; hemoglobin 90; erythrocytes 4500000; coagulation time 5 minutes 45 seconds; blood culture sterile. *Gonococcus* fixation test strongly positive.

Owing to the fact that he refused to remain in the hospital as long as we desired, a test of his cerebrospinal fluid by the Swift-Ellis method was not possible.

## ETIOLOGY.

Recurrent intraocular hemorrhage has frequently been reported in the literature, in many cases becoming progressively worse over a period ranging from 6 weeks to 3 years. Numerous causes are assigned to this form of vitreous hemorrhage. Noll<sup>1</sup> states that they may arise from: (1) Alterations in the blood (leukemia, pernicious anemia); (2) circulatory changes met with about puberty; (3) local vascular disease due to malaria, septic absorption, degenerative changes in the vessels, and hemophilia.

It is in this latter grouping that I should include the first case which I have reported, as the amount of septic absorption which must have taken place in this patient must have been tremendous. This seems the more probable in view of the negative findings in other directions.

Among other causes are, tuberculosis, which is considered by Axenfeld as the cause of intraocular hemorrhage in young persons, and of retinal periphlebitis. Knapp<sup>2</sup> reports two cases having this origin, one of which was cured and the other improved under the use of tuberculin. Cramer<sup>3</sup> and Fleisher<sup>4</sup> each report a case of retinal periphlebitis, with hemorrhage, of tuberculous origin. Lawford<sup>5</sup> believes it not improbable that recurrent vitreous hemorrhage in young men may be due to the consequences of *intestinal stasis*.

*Syphilitic infection* may result in vitreous hemorrhage, as in a case reported by Chevalier<sup>6</sup> in which improvement followed antisiphilitic drugs. But, on the other hand, this patient had other series of hemorrhages from which he recovered after treatment along different lines.

Renal disease, and trauma not infrequently are followed by intraocular hemorrhages.

Massive spontaneous hemorrhages occur less frequently than the recurrent variety. The second and third cases of my report belong to this type in which the vitreous was suddenly filled with blood and vision permanently lost. Both of these were probably specific in nature, which was shown by the positive Wassermann in one, and in the other, while the serum Wassermann was negative, we

had hoped to establish it definitely by a spinal Wassermann.

Clegg<sup>7</sup> reports 4 cases of spontaneous hemorrhage and states that the knowledge of the cause is incomplete, and that the treatment follows no definite lines nor gives hope of bettering the condition. As bearing out the truth of this latter statement, the treatment given the cases under observation failed to favorably modify the condition.

## TREATMENT.

The various methods employed for the *absorption of vitreous hemorrhages* are very well reviewed by Ormond<sup>8</sup>, who recalls that, in the process of absorption, (1) the fluid is carried away by lymphatics and bloodvessels; (2) the solid constituents are removed by the leucocytes; the red corpuscles are destroyed and assimilated, the blood pigment being found subsequently in the surrounding tissue and in the lymphatic glands; and, lastly, the fibrous coagulation remaining is invaded by fibroblasts which gradually convert the residue into fibrous tissue which contracts and decreases the volume of the exuded mass.

He tries to influence this by: (1) Massage, (2) Ionization. He says that it is difficult to decide what effect, if any, ionic medication has until we are sure the condition is influenced by some drug or by some mechanical agent. He has used potassium iodid with the idea that iodine would be beneficial, but it is quite probable that potassium iodid only acts by general effect, and not by any local means, and its effects on thyroid secretion are of more value than any local action. In giving ionization to the eyes, a pad, 1 inch square, of 16 thicknesses of lint, is soaked in a 1 per cent solution of the drug to be driven in. The eye is closed and the pad held against it by the patient by a metal electrode connected with a battery. A pad on the back of the neck forms the other electrode. Three, four or five milliamperes of current are used for 15 or 20 minutes, then gradually turned off. This is repeated three times a week, with massage. There is no discomfort. The drugs used are quinin (under the anode), iodine (under the cathode), and occasionally chlorin. (3) Subconjunctival injections, the action of



which is explained on physiologic grounds.

He has used normal saline every 2 or 3 days; if improvement occurred, it was continued; if no improvement occurred after ten or twelve injections, it was discontinued. He believes that the effect is mechanical only, in increasing the blood supply. (4) Removal of some of the fluid and its substitution by normal saline. (5) Fibrolysin, which causes a great increase of leucocytes in the blood. Ormond states that this should make it useful but the inflammation accompanying vitreous hemorrhage rarely is sufficient to produce iritis, and any extra irritation is to be avoided at all costs, because it would probably produce further changes in the clot, and lead to an increased number of fibroblasts, thus accentuating organization.

There seem to be other observers, however, who have obtained good results from the use of this substances in vitreous hemorrhage. Ollendorff<sup>9</sup> obtained a doubling of visual acuity after five conjunctival injections of 0.3 to 0.6 cc. of fibrolysin at intervals of from 4 to 10 days, in a case of dense vitreous opacities from a tuberculous uveitis in which cautious use of old tuberculin and other lines of treatment had failed. Thilliez<sup>10</sup> reports a case in which, after numerous relapses, very marked benefit seemed to result from intragluteal injections of fibrolysin 0.2 gm. repeated three times a week. More recently, Westphal<sup>11</sup> in one case, reports an increase of vision from about 1/12 to 1/4 after 2 injections subconjunctivally of 1/10 cc. of a solution of 0.01 centigram of thiosinamin with 0.0075 milligram of antipyrin to each cc. This treatment covered a period of about 5 weeks. (6) Dionin, he believes, probably of value as a result of the increase in lymphatic activity. (7) Potassium iodid is probably of value in that the iodine possibly combines with the albuminous material in the blood clot and forms a soluble albuminate which can be absorbed. It may also, by stimulating thyroid secretion, modify the formation of new connective tissue. (8) Radium. The investigations of Chambers and Russ showed that the Beta and Gam-

ma rays had no effect upon normal blood. The Alpha rays had a hemolytic action, the hemoglobin being released, and oxyhemoglobin changed to methemoglobin. The white cells degenerated and, in certain experiments, the leucocytes seemed to move away from the area exposed. They had apparently no selective activity, the difference depending upon the resisting power of the tissues, and it is probable that epithelial cells, being more highly differentiated and developed, would have less resisting power than the less differentiated connective tissue cells. For this reason, it seems to Ormond that, in using radium to destroy fibroblastic cells in organizing blood clot, we must be careful not to injure the corneal epithelium or the more highly developed cells of the retina. He doubts whether radium would be of much value because of this danger. Theoretically, he is not at all hopeful that radium is likely to produce very satisfactory results, but sees no reason why it should not be tried, as theory and practice do not always coincide, and, so long as care is taken, the effect is more likely to be negative than positively harmful, and some benefit may declare itself.

As radium has a hemostatic action, it may be used as soon after the injury as possible, and it is likely perhaps at that time that some benefit might be obtained; also the destruction of the red cells would probably render the blood more capable of absorption. In later stages, however, when organization has begun, it may prevent fibroblastic cells from entering the mass and so delay clotting, leaving the blood still fluid, and hence more capable of absorption. He recalled that Koster, at the International Congress of Medicine, stated that he had obtained improvement in cases of vitreous hemorrhage by radium, and had found it had a hemostatic action, so that he was able to use it in the early stage.

Bennett<sup>12</sup> reported a case in which recurrent vitreous hemorrhage was definitely improved by thyroid.

It is unfortunate, for a full study of the causes in these conditions, that we cannot have the full cooperation of the patients, as it is only after most careful search, in some of these cases, that the cause can be discovered. Likewise, in



treatment, if any means will be found which will cause these masses of extravasated blood to be absorbed without leaving a dense residue, with consequent loss of sight, it will only be after much

study. The present multiplicity of remedies used in attempts to clear up these hemorrhages shows that we are as yet far from having an ideal method of treatment.

### Bibliography

1. Noll. Zeitschrift für Augenheilkunde, v. 63, 1909, p. 213.
2. Knapp. Archives of Ophthalmology, v. 42, p. 1.
3. Cramer. Klinische Monatsblätter für Augenheilkunde, Jan. 1913, p. 58.
4. Fleischer. Klinische Monatsbl. f. Augenheilkunde, August, 1913, p. 245.
5. Lawford. Ophthalmoscope, v. 11, p. 416.
6. Chevalier. L'Ophthalmologie Provinciale, v. 10, p. 3.
7. Clegg. Ophthalmoscope, v. 14, p. 583.
8. Ormond. Ophthalmoscope, v. 14, 1916, p. 461.
9. Ollendorff. Zeitschrift f. Augenheilkunde, v. 24, 1910, p. 30.
10. Thilliez. La Clinique Ophtalmologique. v. 16, 1910, p. 313.
11. Westphal. La Clinique Ophtalmologique, v. 21, 1916, p. 656.
12. Bennett. Ophthalmoscope, v. 11, p. 20.

## THE RISE AND PROGRESS OF OPHTHALMOLOGY AS A SPECIALTY IN PHILADELPHIA

SAMUEL D. RISLEY, M. D.

PHILADELPHIA.

An historical sketch of the early ophthalmologists in that city, their organization, the institutions they worked in, and their more important contributions to the literature and science of ophthalmology, read before the Section on Ophthalmology of the College of Physicians of Philadelphia.

The silent years as they pass carry with them the men whom they had cherished, obscure the memory of their accomplishments, and conceal their measure and motive; their designs and aspirations. It is, therefore, highly fitting and important that each generation should preserve, as far as may be, an imperishable record of its noteworthy achievements and of the men who wrought them. Having this in mind, I have prepared the following brief history of *the rise and progress of Ophthalmology* as a special branch of Medicine and Surgery in Philadelphia, together with some account of the men whose names appear in its annals—names, many of which still linger fondly in our memory.

No consistent register has been preserved of the eminent men to whose labors we are indebted, or of their contributions to our knowledge other than is to be found in biographies, or memories compiled by the friendly hand of some appreciative contemporary, by patient

search in the published proceedings of many scientific societies, or through the medical press of approximately three generations. To search thoroughly for their scientific work and register the result as a demonstration of the steady progress of ophthalmology in our City, would be a worthy memorial to the industry, ability and renown of a considerable group of notable men who honored Philadelphia by their character and labor, and left to us a great inheritance. Valuable as such a record would be it would not convey an adequate conception of the intimate personal relationship of these men to their work, and to the social and sociologic environment of their time. Any account of this phase of the origin and progress of ophthalmology in Philadelphia must, in a large measure, be afforded by the recollections of former conditions and events by those still living. Recognizing fully that any personal memory or estimate may be faulty, it is nevertheless the only resource in the absence of a writ-

ten record of the events as they transpired.

#### THE FIRST PUBLIC INSTITUTION.

The first record of any organized effort for the study and treatment of the diseases of the eye is the report of a meeting held February 8, 1822, for the founding of THE PENNSYLVANIA INFIRMARY FOR DISEASES OF THE EYE AND EAR. A brief account of this meeting was published by the late Charles A. Oliver, from which the following statement is taken:

"Mr. James Gibson acted as Chairman, Dr. Isaac Hays as Secretary, Mr. Richard C. Wood as Treasurer. Wm. Meredith, Charles N. Bancker, Manuel Eyre, Robert M. Patterson, M. D. Clement C. Biddle, Wm. McIlvaine and Richard C. Wood were chosen as Managers; Dr. Isaac Hays, Dr. George B. Wood, Dr. John Bell and Dr. Robert E. Griffith were elected as the Surgical Staff. Number Four South Seventh Street was subsequently rented at \$100 per year for the purpose of the Infirmary."

That the enterprise met successfully the benevolent design of its founders is made evident in the fact that four years later, 1826, Dr. Isaac Hays, while Surgeon at the Infirmary, is reported by Dr. Alfred Stille, in an eloquent memoir, to have published the following papers:

(1) "Inflammation of the Conjunctiva," Philadelphia Journal of the Medical and Physical Sciences, Vol. XIII. P. 84. 1826.

(2) "Inflammation of the Sclerotica," Ibid. P. 211. 1826.

(3) "Iritis." Vol. XIV. Page 217. These papers, Dr. Stille remarks, "appear to have laid the foundation of the high repute which Dr. Hays afterward attained as an ophthalmic Surgeon and probably determined his selection as one of the first Surgeons at the Wills Hospital," eight years later.

It is of interest to note that the men who composed the Staff of the Infirmary were general surgeons and physicians, and two of them, Dr. George B. Wood and Dr. Isaac Hays, had even then won a wide reputation in the professional field. The subsequent history of the institution is uncertain.

#### WILLS EYE HOSPITAL.

Notwithstanding the earlier effort, the

establishment and growth of ophthalmology in Philadelphia is indissolubly associated with the founding of the Wills Hospital through a bequest to the Mayor and corporation of the City of Philadelphia by one James Wills, Jr., in 1825, which, because of protracted litigation by the heirs, did not become effective until 1831. The remote influences and circumstances which culminated in this foundation date back to Colonial times. Anthony Benezet, a philanthropist of Philadelphia, was born in Picardy, France, in 1713. His parents were driven from their native land by religious persecution in 1715 and took refuge in England, where they adopted the religious views of the Quakers. In 1731 he emigrated to Philadelphia where he was cordially received by the Society of Friends. His home was established at 115 Chestnut Street, above Third, near the present site of the Bank of North America. His philanthropy is still perpetuated in a school for "Colored Youths" situated on the northeast corner of Hutchinson street, a small thoroughfare off Locust street, west of Ninth, to which he left a legacy of ground rents. He had in his employ a coachman, one James Wills, who after the lapse of years left the employ of the benevolent French friend, and with his small savings began an independent business as a grocer on Chestnut street near Front. At his death he left his fortune and business to his son, James Wills, Jr. Both father and son seem to have been imbued with the benevolent spirit of Anthony Benezet, for on the death of James Wills, Jr., on January 22, 1825, after sundry bequests, he conveyed the residue of his estate to the mayor and corporation of the city of Philadelphia, for the time being and to their successors in office forever, in trust, for the purchase of a sufficient plot of ground in the City of Philadelphia, or in the neighborhood thereof, and thereon to erect, or cause to be erected, suitable buildings for a hospital or an asylum, to be denominated "The Wills Hospital for the Relief of the Indigent Blind and Lame." The mayor and corporation of Philadelphia were to appoint trustees and managers to carry out the will of the testator. After a period of litigation the

residue of the estate passed into the control of the mayor and corporation in 1831 and has to the present time been administered as one of the numerous city trusts. It is of interest to note that under the terms of the will it was not clear whether the founder had in mind an asylum for the care of the blind, or a hospital for the treatment and care of indigent persons afflicted with diseases of the eye. After much discussion the inquiry was decided, fortunately, in favor of the latter possible interpretation of the will of the testator.

The corner stone of the present central building situated on Race street, then known as Sassafras street, west of Eighteenth, and constructed on plans drawn by Thomas N. Walter, was laid with suitable ceremony on April 2, 1832. An eloquent address by Mr. Joseph R. Ingersoll was delivered, and the completed building, with its strikingly classic Greek front elevation, ready for the fulfillment of the noble design of its founder was turned over to the mayor and councils by the committee on construction on November 28, 1833. On February 3, 1834, Dr. Isaac Parrish, Dr. Squier Littell, Dr. Isaac Hays and Dr. George Fox were appointed as the first Surgical Staff of the Hospital, and on March third the institution was opened for the reception of patients. The hospital then began its singularly beneficent career with the above named eminent physicians in charge of its wards, giving their time and service gratuitously for the relief of a special class of the afflicted. During that year, 1834, forty-nine patients were received into the wards. Until 1839 there was no service or clinic for out-of-door patients applying daily for treatment, but living in their own homes; nor is there any record of the appointment of a resident medical officer. The subsequent history of the institution shows a steady and rapid growth, and extending reputation and usefulness, until in 1916 there were upward of seventeen thousand new patients.

This rapid and continuous growth not only demonstrated forcibly the need for such a charitable foundation in the community, but with equal force the fact not generally recognized or appreciated, that not only would the Wills Hospital, but

many other charitable foundations in our city, have failed to meet the benevolent design of their founders, but for the gratuitous labor of the physicians and surgeons who compose their respective professional staffs.

Primarily designed as a pure charity under the terms of the bequest, the Wills Hospital committee of the Board of City Trusts has strictly observed the intention of the testator, denying its benefits to all but the indigent, and no private rooms have ever been provided for the care and treatment of patients able to pay for professional advice. In this history, however, we are not so much concerned with the Wills Hospital as a charity, valuable as it has been in that phase of its career, as with its even greater value and importance as a school of ophthalmology, and this it has proven to be almost from the beginning.

A list of the men who have served on its staff of surgeons from 1834 to 1870, without exception renowned in the annals of Philadelphia medicine, is a sufficient explanation of how and why, without any expressed design upon the part of its founder or administrators, it became a School of Ophthalmology. Isaac Hays, George Fox, Squier Littell, Isaac Parrish, John Neill, Edward Hartshorne, T. G. Morton, George C. Harlan, A. Douglass Hall, F. W. Sargeant, Addinell Hewson, Wm. Hunt, R. J. Levis and D. Hays Agnew constitute a galaxy of men widely known, whose fame as teachers not only brought a steadily increasing number of patients to their respective daily clinics, but attracted many medical men both from the city and remote districts to study diseases of the eye.

It will be observed that none of these men were devoted solely to the practice of ophthalmology, they were first of all general surgeons and physicians. In addition to this group of well known men there was a still larger group during this period, from 1834 to 1870, made up of resident and assistant surgeons, many of whom have been awarded signal honor in the field of ophthalmology in the United States, affording a striking illustration of the hospital as a school. It is to be noted that during these years, there were few if any specialists in the



practice of medicine and surgery. It is true that in the medical schools were taught the seven branches by men who became especially expert and, quite without design on their part, were in some measure recognized as specialists in their respective fields and as consultants by the body of the profession. This was particularly true of Surgery and Obstetrics, and in less degree of the theory and practice of medicine; but these men did not regard themselves as specialists, nor did they confine their practice to the branches they taught.

Indeed, in the mind of the profession prior to 1870 there existed a deep seated prejudice against any claim to a special knowledge of the diseases of any organ and any such claim relegated the individual to the unsavory confines of charlatanism. This hostility to the specialist in medicine was due in large measure to the bizarre advertisement of the ignorant charlatan; a survival from earlier times of the medical mountebanks whose character and methods had justified the lampoons and caricatures by contemporary poets and novelists in ridicule of the doctor; characterizations which still survived in the memory of the educated portions of the community, and rankled in the mind of the doctor of that day, as they do in ours, as an injustice to a learned and philanthropic profession. (As an example of the methods pursued by these characters, I recall a sign in large gold letters on the windowpane in the second story of a building confronting my preceptor's office, "Dr. Reed and Dr. Lichten spiel, *Specialists* in Diseases of the Eye, Ear, Lungs and Pelvis Organs—Examination Free." Nor can I forget the emphatic language of my preceptor with which he consigned these "Frauds" to the seventh depth of some medical inferno.) It is even now difficult to comprehend why the pen of genius, as represented by Eugene Sue should have passed by the honorable membership of the French Academy to depict instead the unsavory character of N. Baleinier, or Dr. Louis or Balsame, while it is only fair to suppose that the Clinical Society of London, or the Sydenham Society, might equally have furnished for contemporary literature, material for other pictures

than the shafts of caustic satire or malice and ridicule.

In 1870, however, a number of potent factors were present which rapidly undermined the hostility to specialism. For a few years a small group of men had been practicing ophthalmology more or less as a specialty and according to the recognized standards of ethical medicine. These men were Dr. W. W. McClure, Dr. Ezra Dyer, Dr. P. D. Keyser, Dr. A. Douglass Hall, Dr. George C. Harlan and Dr. William Thomson. But prior to the work of these men was the efficient service rendered for more than thirty years by a group of able, not to say extraordinary men, who, while engaged in the general practice of medicine, and renowned for their diversified learning and philanthropies; many of them members of families prominent from Colonial times, had nevertheless devoted the greater part of their laborious professional service to the study, teaching and treatment of diseases of the eye while serving as members of the Wills Hospital Staff. Their influence and work as teachers and consultants could not fail of recognition and appreciation and had done much to remove the prejudice entertained by the body of the profession against specialism.

I know of no more inspiring study than the memoirs and biographies of these men to whom we are in a large measure indebted for the foundations they laid upon which our present ophthalmologic structure is reared. Dr. Isaac Parrish, although of remote Dutch ancestry, was a member of the Society of Friends. In accordance with the practice of his day he was a student of medicine in the office of Dr. Joseph Carson in 1830 and 1831; a resident physician at the Blockley Hospital, and in 1834 was appointed to the Wills Hospital as a member of its first surgical staff. He was the most active member of the staff as a teacher and gave the first regular course of instruction at that institution; probably the first given in Philadelphia on ophthalmic surgery, during the winter of 1839 and 1840. He occupied this position upon the staff until his death in 1852 and was always surrounded by classes of students. In addition, he was an active member of the College of Physicians,

took a leading part in the County Medical Society of which he was twice president, and was a member of the committee on founding the American Medical Association. He was deeply interested in the hygienic condition of the city and was constant in his efforts to improve the insanitary conditions prevailing then, as now, in the numerous courts and alleys of the municipality. He was also an earnest advocate of prison reform.

Dr. Isaac Hays was born in 1796, graduated from the University of Pennsylvania as Bachelor of Arts in 1816 and Doctor of Medicine in 1820. In 1822 he was appointed a member of the staff of the Pennsylvania Infirmary for Diseases of the Eye and Ear, from which post we find his fertile mind contributing to literature the fruits of his observation of diseases of the eye—certainly among the first, if not the first, contributions to ophthalmic literature in America. In 1827 he became editor of the *American Journal of the Medical Sciences*, and conducted this important periodical with great renown until 1879. In 1834 he was appointed on the Surgical Staff of the Wills Hospital, a post which he filled with marked industry until 1854. During those years he edited and added to the then famous work of Sir William Lawrence, "Diseases of the Eye," for which he received the general thanks and admiration of its widely known author.

He recorded the first case of astigmatism published in America. Donders cites in historical order the first five cases reported of which Dr. Hays' case stands as the fifth. Dr. Jeffries of Boston gives him the credit of having observed the first case of color blindness as a pathologic condition. During his service at the Wills Hospital he devised a knife for the cutting up of hard cataract to secure its absorption. This knife, although not used for the purpose designed by its inventor, is still in daily use at the Hospital for discissions of soft cataract, for capsulotomies, etc., and is still known as the "Hays' Knife." In the midst of these activities he edited "Elements of Physics," "Wilson's Orthology," and a dictionary of medical terms. He was one of the founders of the Franklin Institute, a frequent attend-

ant at the Wistar Parties and a delegate to the convention which originated the American Medical Association in 1846. He was a member of the Philosophical Society and was chairman of the building committee of The College of Physicians of Philadelphia. His biographer, Dr. Gross, makes the following eloquent comment: "He lived a busy and fruitful life, a striking example of the amenities of scholarship, and lived in a home of luxury surrounded by a group of friends—medical men—gentlemen of the old school."

Dr. Squier Littell, born 1803, was a student of medicine in the office of Dr. Joseph Parrish in 1821, and graduated M. D. from the University of Pennsylvania in 1824 becoming a general practitioner of medicine; and in 1834 was appointed one of the Staff at the Wills Hospital and published his widely known text-book on "Diseases of the Eye" in 1837, followed in 1838 by his brochure on "Tumors of the Brain as a Cause of Amaurosis." He gained a wide and just reputation as an Ophthalmic Surgeon, his text-book being regarded for many years as an authoritative statement of diseases of the eye. Among his many other activities he was an earnest churchman and a member of the Committee on revision of the Prayer Book. He served as a member of the Wills Staff continuously from 1834 to 1864.

Dr. George Fox, the fourth member of the original Staff, was born May 8th, 1806. He was an Orthodox Friend and a grandson of Joseph Fox, the speaker of the Colonial Assembly. He was graduated from the Department of Arts of the University of Pennsylvania in 1825, dividing the second honor on Commencement Day with his life-long friend Adolph Borie, and began the study of Medicine under the preceptorship of Dr. Joseph Parrish and his brother, Dr. Samuel M. Fox. After his graduation at the University of Pennsylvania in 1828 he became Resident Surgeon of the Pennsylvania Hospital where he was the inventor of the apparatus for the treatment of fractured clavicle which is still known by his name. His biographer, Dr. Ruschenberger, relates that "he speedily acquired local reputation as a Surgeon,



Oculist, Obstetrician, and skilled Physician." In November, 1839, he contributed to the American Journal of the Medical Sciences, edited by his friend and colleague Dr. Hays, a "Report of Cases of Diseases of the Eye Treated at the Wills Hospital during the months of April, May and June, 1839." He delivered clinical lectures at the Hospital but resigned in 1849 and was immediately elected a member of the Board of Managers of the Hospital and served in that capacity until his resignation in 1854. In 1848 he was Visiting Surgeon to the Pennsylvania Hospital where he served six years, then he resigned, apparently retired from professional work, and died in 1882 at his place on the Delaware River above Torresdale.

Such in brief was the work and measure of the four men who composed the first Staff at the Wills Hospital, who with much justice may be accredited with having laid with great industry and honor the foundation for Philadelphia Ophthalmology; a foundation deeply imbedded, firmly rooted in the rich soil of general scientific medicine; a condition essential for development and permanency. One is reminded in their lives and work of the famous contention of Alexander Hamilton in the infancy of the Republic that "A Nation of Specialists, whether farmers or bankers or manufacturers, lacks the essential conditions of permanency; for its various parts (when working independently), do not afford an adequate support one to another."

#### SCHOOLS AND SOCIETIES.

Noteworthy among the influences which in 1870 led to an almost sudden change in the establishment of Ophthalmology as a specialty in Philadelphia was the opportune return of Dr. William F. Norris and Dr. George Strawbridge from their studies in the special clinics of Europe. Soon after their return they were appointed Lecturers on Ophthalmology and Otology in the Medical Department of the University of Pennsylvania, then situated on the west side of Ninth Street between Market and Chestnut Streets, on the site of the present U. S. Post Office Building.

There were no hospital facilities provided but a daily clinic at two o'clock P. M. was opened for the gratuitous treatment of diseases of the Eye and Ear. From this service was drawn illustrative material for a weekly clinical lecture to the medical students. The lectures were given in the Anatomical Amphitheatre but attendance was not obligatory, and the classes were small; nor was an examination in Ophthalmology and Otology required for the medical degree. It was, nevertheless, the beginning of organized ophthalmic teaching at the University of Pennsylvania:—the dawn of a new Era.

Another influential factor in the establishment of Ophthalmology was the organization of the American Ophthalmological Society in New York City in 1864. It was composed of men, all or most of whom, had become personal friends during foreign travel and study in European Clinics. Their annual meetings for the presentation and discussion of papers soon became notable and inspiring occasions for delightful social intercourse and the cementing of enduring friendships; until they became a band of brethren zealous for professional renown and exemplars of the highest professional ideals. It was at the second annual meeting, June 13th, 1865, with twenty members present that our own Dr. Ezra Dyer, too soon lost to Ophthalmology, presented his important paper on "Asthenopia and Its Treatment by Graduated Exercise of the Accommodation" which afterward came to be known as "Dyerism." The published transactions of this Society setting forth the scientific work of its gradually increasing membership, rigidly selected from different sections of the country, soon proved a powerful influence, not only in removing any hostility to specialism, throughout the United States, but as a noteworthy example of the highest standards of medical ethics and practice. There probably is no other single publication where one can better trace the progress of scientific ophthalmology or the rising tide of professional *Esprit de Corps* than in the transactions of the American Ophthalmological Society. In the annual recurring volumes new names



are introduced. In 1865 appear among the founders Thomas G. Morton, and Ezra Dyer; in 1869 A. D. Hall and William Hunt; in 1870 William F. Norris and William Thomson; in 1871 George Strawbridge and later George C. Harlan; all of whom were at the time or a few years later members of the Wills Hospital Staff. The subtle and powerful influence of the annual meetings of this Society over the establishment, reputation and progress of Ophthalmology in the United States cannot be overestimated. In no city was its influence more signally felt than in Philadelphia. Its standard was such that an invitation to membership could but be regarded as a signal honor.

Another important event as indicating the rising tide of specialism in this City was the founding of the "Ophthalmological Society of Philadelphia." The meeting for organization was held on February first, 1870, in the Pennsylvania Hospital at eight o'clock P. M. There is no record of the influences leading to the call for this meeting. The minutes were in the hand-writing of Dr. William F. Norris and the following named men are recorded as present: Doctors R. J. Levis, George Strawbridge, W. F. Norris, Wm. Thomson, E. Hartshorne, Morris Longstreth, Thomas G. Morton, Harrison Allen, W. W. McClure, A. D. Hall, J. N. Brinton, Ezra Dyer, L. H. Adler and Wm. Hunt. Organization was effected by the election of R. J. Levis as temporary President, and Wm. Hunt as temporary Secretary, on motion of Dr. T. G. Morton. The following men were then reported as wishing to be included in the original organization: Drs. Isaac Hays, F. F. Maury, D. H. Agnew, O. P. Rex, J. N. Packard, S. W. Gross, E. A. Page, W. H. Pancoast, J. F. Weightman, E. Livezy, G. C. Harlan, C. S. Boker, A. Hewson, T. H. Andrews, W. W. Keen, John Ashhurst, Jr., and H. S. Schell:—a representative group of men in the annals of Philadelphia Medicine and Surgery.

A permanent organization under the title of "The Ophthalmological Society of Philadelphia" was then effected by the election of Dr. Isaac Hays as President, then aged seventy-four years; Dr.

E. Hartshorne and Dr. T. G. Morton as Vice-Presidents, Dr. Wm. F. Norris as Secretary, and Dr. Wm. Hunt as Treasurer, Dr. George Strawbridge and Dr. L. H. Adler acting as tellers. Drs. Thomson, Allen, Dyer, Brinton and Strawbridge were appointed a committee to draft a constitution and by-laws for the government of the Society. The temporary Chairman and Secretary were on motion added to the committee. Dr. Hartshorne was appointed a Committee to "ask permission of the College of Physicians to meet in their building." The meeting then adjourned to meet at the call of the Committee on Constitution and By-Laws. This second meeting occurred on February 15th, 1870, place not stated, but presumably at the College of Physicians, as all of the subsequent meetings were held there, then situated at Thirteenth and Locust streets. The draft of the Constitution and By-Laws was presented by the Committee and adopted after prolonged discussion over the publication of papers "*as read before The Society*," elsewhere than in its transactions; the permission to do so being finally granted only after the consent of the Society. No copy of the Constitution and By-Laws as adopted are included in the minutes, but quite recently an engrossed copy was accidentally discovered in my own library, and is herewith presented with the Constitution as adopted for presentation to the College.

The first meeting for scientific business was held on March first, 1870, and was devoted to the presentation by Dr. T. G. Morton of three cases of orbital aneurism with exophthalmos which was discussed at length by Dr. Wm. F. Norris. Dr. Samuel Ashhurst. Mr. S. L. Fox and Mr. Joseph Zentmayer, opticians, were added to the list of original members. The meeting of April first was devoted to intraocular cysticercus. In the course of the discussion Dr. R. J. Levis detailed a case where numerous cysticerci were found in the straight muscles of the eye. It is of interest to note that at this meeting Dr. Strawbridge exhibited a tonometer of his invention. The meetings held monthly, were well attended, and the elaborate minutes of the scientific proceedings, all in the handwriting of Dr.

Norris, set forth their highly interesting character. On March 7th, 1871, Dr. S. D. Risley was introduced as a new member of the Society but had been present by invitation at several of the preceding meetings. Dr. Isaac Hays, the President, had not presided over any of its meetings probably because of advanced age and failing health. The monthly meetings recurred with unabated interest and enthusiasm until November, 1872, at which time there were present Drs. Wm. F. Norris, T. G. Morton, Samuel Ashhurst, John Ashhurst, Jr., Wm. Hunt, H. S. Shell, R. J. Levis and S. D. Risley. There is no minute of another meeting until November, 1874, after an interval of two years. No scientific business was transacted, but Dr. Wm. F. Norris moved that "the Society proceed to dissolve and that the funds on hand be turned over to the library of the College of Physicians of Philadelphia for the purchase of books upon the subject of Ophthalmology." This motion with some modifications, was favored by Dr. Thomson and Dr. Harlan, but opposed by Drs. Goodman, Strawbridge and S. Ashhurst, and resulted in an adjourned meeting when Dr. Norris repeated his motion which was lost. A stated meeting was held January 5th, 1875, at which the resignations of Drs. S. Ashhurst, Wm. F. Norris, George C. Harlan, S. W. Gross, H. S. Shell, and Wm. Thomson, were presented and accepted. The President, Dr. E. Hartshorne, the Secretary, Dr. A. D. Hall, and the Treasurer, Dr. Wm. Hunt, then resigned their respective offices. Dr. Strawbridge was then elected President, Dr. McClure Secretary and Dr. Ernest Goodman as Treasurer. Only two subsequent meetings were recorded, both of a social character at the residence of Dr. Strawbridge, the last being in April, 1875.

The writer recalls his personal regret over the dissolving of the Society because of the absorbing interest of its meetings. The earnest presentation of unusual cases, their study and discussion by the group of vigorous men who regularly assembled at its meetings for two years left an enduring impression upon his mind, not only as a young student of Ophthalmology, but as an uncon-

scious student of methods and of men. One longs for the inspiration of genius and the brush of the master painter, the chisel of the great sculptor, or even for the skilled pen of the ready writer, that he might call forth from the storehouse of memories and place before this generation the portraits of this group of men; individual, independent, each a distinctive forceful personality. But what canvas would retain, or marble portray, or words reveal the enthusiasm, the industry, and the indomitable pursuit of truth for truth's sake, with which each was imbued and which quite unconsciously emanated from each to other as he took the floor in presentation of cases for study by his colleagues or rose for discussion. To the young onlooker it was educational and inspiring. Strange indeed if the lives and work of these men, had awakened no echo in the generation to follow.

It soon, however, became obvious that the membership of the Society was not homogeneous. It was constituted by two groups, inevitably divided by the subtle barrier of training. On the one side stood an assemblage of well and widely known teachers, general physicians and surgeons; on the other a smaller group of equally well known men who had thoughtfully chosen to devote their lives to the study and treatment of the diseases of the Eye. The final dissolution was indeed an expression of the leaven of specialism, working more and more potently in the medical life of the city.

#### PERSONAL EXPERIENCES, TEACHING.

This brings the record of events within the purview of my personal experience. It is not, however, the design of the author of this historical sketch to present an autobiography, but to record events and conditions as they transpired under his observation. Prior to 1870 the course of Medical instruction required for the degree of M. D. was a series of lectures in the seven branches:—Anatomy, with opportunity for dissection; Physiology; Chemistry; *Materia Medica* and Therapeutics; Institutes of Medicine; Obstetrics and Surgery. The lectures were given daily in each of these branches



from October to March. A second year was required, the same lectures being repeated from the respective professional chairs. At the close of the second year an oral examination was held by each professor in his own branch and a thesis required.

In addition to these didactic lectures, a weekly clinic was held by the professors of Therapeutics, Practice of Medicine and Surgery, and a Surgical Clinic at the Philadelphia and Pennsylvania Hospitals, on each Wednesday and Saturday, open to all medical students in the city. Occasionally an eye case, usually some inflammatory affection, would apply for treatment, or, at the Surgical Clinic, an occasional case of cataract or strabismus. On one of these occasions I witnessed for the first and only time a couching of the opaque lens. A young girl was brought to the clinic for the correction of what I now know to have been concomitant converging strabismus. The parents were advised against operation because the squint made her appear "cute" and if the muscles were cut the squint would either return or the eye was likely to turn outward. No word was said about the refraction. During the winter of 1869-1870 Dr. Henry D. Noyes of New York, by invitation, gave a lecture on "Ocular Affections," which was illustrated by colored lantern slides of the *Fundus Oculi* and Dr. Wm. Thomson, then Assistant Surgeon at the Wills Hospital, a lecture at the Pennsylvania Hospital on "Errors of Refraction." It was at this lecture I heard, for the first and only time in my Medical Course at the University, the terms myopia, hypermetropia and astigmatism.

There was at that time no ophthalmologic teaching in Philadelphia excepting the desultory instruction incidentally given at the Wills Hospital.

In April, 1871, a year after my graduation in Medicine, a case of eye disease applied for treatment but proved refractory. The rapid recovery after consultation with Dr. D. Hayes Agnew, who had been on the Wills Staff from 1864 to 1868, demonstrated to me my profound ignorance of eye diseases, and resulted in a visit with Dr. Chas. K. Mills to the Wills Hospital seeking opportunity to

observe and study. Dr. Mills, just then beginning his studies in Neurology, remained several years for the study of Ophthalmoscopy and Ocular Diseases. To my great gratification, Dr. George C. Harlan at this first visit invited me to assist him as clinical clerk:—an invitation which was eagerly accepted and proved the beginning of a delightful association as pupil and teacher, friend and colleague to the close of his busy and useful life. His colleagues on the Hospital Staff were: Drs. T. G. Morton, A. Douglass Hall and R. J. Levis, their respective terms of service being three months. As Assistant Surgeons, there were: Drs. Harrison Allen, W. W. McClure, Edward Livezy, Wm. Thomson and H. E. Goodman. In 1872 Drs. Thomson, Goodman, Wm. F. Norris, W. W. McClure, P. D. Keyser and Ezra Dyer were appointed Surgeons, thus increasing the Staff to ten. The term of service was made continuous for each Surgeon throughout the year, on alternate days, five Surgeons being on duty each day. In 1871, I assisted Dr. Harlan during his three months term of service and remained with Dr. Thomson and later with Dr. Hall through their respective terms, at the close of which I was requested by Dr. Norris to assist him as Chief of Clinic at the newly established Eye Service at the University of Pennsylvania.

The nascent state of Ophthalmology at that time is forcibly illustrated by my year's experience with the different Surgeons at the Wills Hospital. Dr. Harlan advised me to read Donders' Book on the "Anomalies of Refraction and Accommodation," a copy of which I found in the Mercantile Library and studied with avidity, but soon discovered that the members of the Wills Hospital Staff were not familiar with its teachings. Dr. Harlan was Otologist at the Children's Hospital where I assisted him. Drs. Goodman, Morton, and Levis were general Surgeons actively engaged in their general work. In their Wills Service some of the Surgeons in 1871 paid little or no attention to the refraction problems which now engross so much of our attention, but in most respects their Surgery of the Eye was beyond re-



proach. Their skill in the extraction of cataract, as shown by their results, I have not seen excelled in later years. Simple extraction was the usual operation performed. When convalescence was complete the patient was sent to McAllister, then the leading optician in the city, for the selecting of a glass.

That the errors of refraction, however, were gradually asserting their important place in ophthalmic practice was shown by the fact that in 1871 Dr. W. W. McClure gave a course of lectures at the Wills Hospital in the Evening illustrating various phases of the dioptric system of the eye by a lantern and slides, both of his own construction. These lectures, my study of Donders, and the opportunity to apply daily the newly acquired knowledge at the Clinics of Drs. Harlan, Thomson and Hall, soon awakened a deep interest and an early appreciation of the clinical importance of the anomalies of refraction. It was at this time I detected and corrected by glasses my first case of mixed astigmatism which proved to be as great a curiosity to the Hospital Staff as to myself.

The University Ophthalmological Clinics, under the guidance of Dr. Norris, fresh from his European experience, soon became an inspiration to the study of scientific Ophthalmology. Instead of the simple Extraction of Cataract, I witnessed for the first time the "Peripheral, Linear Extraction" of the lens with iridectomy after the manner of Von Graefe, Arlt and Mauthner, who had been his teachers. Cases of glaucoma and the invariable iridectomy appeared at the Clinic, and the correction of refraction errors with atropia—the only mydriatic and cycloplegic then in use, soon became an important feature of the service. I recall the discussions as to whether full or partial corrections of the hypermetropia were to be preferred. Our knowledge of the abnormalities of binocular vision was confined to strabismus, and paralysis of the extraocular muscles. To the students of Donders, however, were known also the variations of the range and region of accommodation and convergence associated with errors of refraction. The anatomic abnormalities resulting in the anomalies of binocu-

lar balance—the heterophorias—were in the womb of the future.

Insufficiencies of the Interni were recognized, but when present in association with myopia were regarded as due to the enlarged myopic eye ball, as taught by Donders, but we overlooked as Donders himself did, the great clinical importance of the observations he had made as to the disturbance of the range and region of accommodation and convergence in the hypermetropic eye. The extensive group of abnormalities of binocular vision, which Stevens denominated many years later as heterophoria, were not understood. The signal importance of the Myopic Eye and the gravity of the associated pathologic changes were recognized. Extensive European literature setting forth the diverse conclusions of many observers as to its nature and etiology was open for study, including the statistics of the school examinations of Cohn of Breslau and Errisman of St. Petersburg and also the observations of Beer of England; but the views we now entertain as to the genesis of the Myopic Eye may be justly accredited to Philadelphia Ophthalmology. Like claim may also be made for work done in our City in impressing upon the mind of the profession the signal importance of the anomalies of refraction and their associated abnormalities, as etiologic factors in the symptom complex of asthenopia.

It had been contended by some observers that the Hypermetropic Eye was to be considered as the Model or Standard Eye since it was present in all animals, and was far more numerous in man than all other states of refraction. In Philadelphia, however, the view was accepted as early as 1873 that Emmetropia was the standard state of refraction and that the ideal conditions for comfortable physiologic binocular vision were constituted by two Emmetropic Eyes, each with normal acuity of vision and a physiologic range and region of accommodation and convergence; that any departure from these ideal conditions must be considered as an anomaly and treated as such.

The acceptance of this view was of signal influence in the progress of

Ophthalmology in our City since by logical sequence it led to the correction of all anomalous states, and, very soon, to the discovery of the wide influence of eye strain as a frequent factor in periodical sick headaches and other nervous disorders. Dr. S. Weir Mitchell, then at the zenith of his notable career as a Neurologist, exerted his influence, in a powerful paper, to the promulgation of its importance, and soon the Neurologist and the Family Physician began to refer patients to the Ophthalmologist for the careful study of the eyes as an aid to diagnosis and for the correction by glasses of a possible error of refraction. As a result in a few years, Philadelphia was, with mild irony, designated by oculists elsewhere as the "Spectacled City."

It had, for example, been taught as the accepted view by many observers that with physiologic growth the small Hypermetropic Eye of childhood developed into Emmetropia; and that under the strain of the requirements of civilized life the antero-posterior axis of the Emmetropic globe increased, resulting in axial myopia. Therefore, it was further taught, that the Myopic Eye was an adaptation to the requirements of civilization. In Philadelphia, however, it was early recognized as a sequel of pathologic states of the uveal tract, and before 1880 numerous cases had been published where hypermetropic refraction had been observed after careful scrutiny to pass over into myopia through the turnstile of astigmatism, in every case accompanied by the pathologic conditions which characterize the Myopic Eye, i. e., the atrophic absorption crescent at the temporal margin of the optic nerve. Furthermore, it was discovered that the careful correction of the preceding hypermetropic astigmatism not only relieved the syndrome of asthenopia, but arrested pathologic states of the *fundus oculi* and prevented the occurrence of myopia.

The contrast between the views then entertained as to the dioptric system of the eye and our present understanding, illustrates forcibly the progress which has been made in a single generation. The contrast is no greater, however, than

that afforded by many other phases of ophthalmic understanding and practice. For example may be noted the inflammatory affections of the Eye and their relation to bacteriology. The infectious character of gonorrheal ophthalmia had it is true been recognized and fully set forth in Philadelphia by Dr. Hays as early as 1826, as had other forms of purulent ophthalmia, but the nature of the infection was not known.

Our own Professor Leidy with strange prevision, as a result of his marvelous observations on parasitism in 1849, had suggested its probable importance in the etiology of disease; nevertheless, in 1872 and for many years after we groped our way in the study and treatment of the inflammatory affections of the Eye, with no consciousness of the coming light; which even then was faintly spreading from the conning towers of a hundred observatories of science, manned by patient self-sacrificing observers of the phenomena of life:—a light which was to prove our conclusions erroneous and lay bare our ignorance of the etiology of disease and the essential nature of inflammation. The science of bacteriology and its relation to disease were practically unknown.

Mention has already been made that in 1870, soon after their return from Europe, Dr. Norris and Dr. Strawbridge were appointed to lectureships in Ophthalmology and Otology at the University of Pennsylvania, then located on Ninth Street north of Chestnut. Dr. Norris, however, having resolved to devote himself to Ophthalmology alone appointed Dr. Bertolet to take charge of the Diseases of the Ear. Three years later when the University was moved to West Philadelphia and the University Hospital erected, Dr. Norris was made Clinical Professor of Ophthalmology and Dr. Strawbridge awarded the Clinical Professorship of Otology. It was not until 1876 that a reluctant Professorial Staff and Board of Trustees awarded a full Professorship to Ophthalmology with a seat in the Faculty from which to direct or control the policy of Ophthalmic teaching. In April, 1872, a few months only after the establishment of the lectureship in Ophthalmology at



Ninth and Chestnut Streets, I received by the hands of the late Dr. Charles Hunter a message from Dr. Norris, whom I had never seen, requesting me to take the position of Chief of Clinic. The opportunity thus offered was eagerly accepted and proved to be the beginning of an unbroken association as teacher and pupil, friend and colleague, destined to continue until the close of his eminently industrious painstaking career. It is with great pleasure I take this opportunity to pay grateful tribute to his memory and to express my sense of obligation to his friendship and example during the formative years of my young professional life.

I have already spoken of the hostility to specialism entertained by the body of the profession in Philadelphia, and of the opportuneness of his return together with his friend Dr. Strawbridge, in 1870. The son of a great Surgeon, his career had been pursued in the best associations of lay and professional life; an alumnus of the University; well endowed intellectually, possessing ample means, and fully equipped for his chosen work in the schools and clinics of Europe; none, not even the most conservative and influential, could gainsay his right to such a choice, assail successfully his position, or criticize his preparation for special work. His personal influence, together with that of a coterie of influential medical friends, and the establishment of the Ophthalmological department in the University proved a powerful factor in placing Ophthalmology in Philadelphia on a sane and lasting foundation.

In 1873 Dr. Wm. Thomson, who had been Assistant Surgeon at the Wills Hospital from 1868 and full Surgeon in 1872, was appointed lecturer on Diseases of the Eye at the Jefferson Medical College, in 1877 Ophthalmic Surgeon to the Jefferson College Hospital, and in 1880 was made honorary Professor of Ophthalmology in the College, and in 1895 full Professor with a seat in the Faculty.

The signal influence of these teaching foundations soon became apparent in Ophthalmological literature, by Philadelphia Ophthalmologists; and in the estab-

lishment of numerous Special Clinics at the various Hospitals in the City for the treatment of Diseases of the Eye and Ear. The organization of the Ophthalmological Section of the American Medical Association in 1879, and the founding of additional periodical journals devoted to this special field soon followed. It is interesting to trace the inspiring influence of great teachers in any branch of science. In the science of Medicine and Surgery we have in Philadelphia only to recall the names of men like Leidy, Stille, Agnew, Goodell, Pancoast and Gross, not to mention many others of our revered teachers, and then to review the large groups of men now eminent in their respective branches, who were inspired by their personalities, their enthusiasm and their teaching, to realize the powerful influence they exerted. In Ophthalmology our indebtedness is equally clear. I have already made mention of the illustrious pioneers whose names appear in the annals of the Wills Hospital. I need only to recite the names of the men who found their inspiration under Dr. William F. Norris at the University of Pennsylvania, and that of Dr. William Thomson at the Jefferson Medical College. Their lives and work are a mutual inspiration, a goad to still greater endeavor. They are with us tonight, or are absent doing service in the armies of the Republic on the "far flung battle lines" of Europe caring for those who are injured in the righteous struggle for democracy:—the Divine, and therefore, inalienable right of men to choose how they shall be governed.

From the clinics of the University and Jefferson College sprang forth a group of younger eager men deeply interested in Ophthalmology and soon the literature of the subject grew in rapidly increasing proportions setting forth the results of their observations. At the University Clinic with Dr. Norris as Ophthalmic Surgeon and myself as Chief of Clinic and Assistant Ophthalmic Surgeon were appointed as Clinical Clerks and aids in the order named, Dr. James Wallace, Dr. George A. Piersol, now Professor of Anatomy at the University, Dr. B. Alexander Randall, at present Professor of Otology; Dr. George E. de



Schweinitz, now Professor of Ophthalmology. During these years at the University Hospital Clinic, I gave systematic courses of instruction to Post Graduate Students coming from remote districts showing the increasing demand at that time for such special instruction. At the Jefferson Hospital Clinic were, Dr. Wm. S. Little, as Chief of Clinic; now deceased; Dr. L. Webster Fox, later Professor of Ophthalmology at the Medico-Chirurgical College; Dr. George Friebeis, Chief of Clinic; Dr. Howard F. Hansell, who for many years has filled the Chair of Ophthalmology as successor to Dr. Wm. Thomson; and Dr. Wm. M. Sweet, at present Clinical Professor of Ophthalmology at the Jefferson Medical College Hospital, and both Ophthalmic Surgeons to the Hospital.

As a means of expression and for an opportunity for mutual study of clinical experience and comparison of views the Section on Ophthalmology of the American Medical Association was organized in 1879. In 1878 Dr. Albert A. C. Heyl, and the Author of this Sketch were requested by the Board of Managers of the Episcopal Hospital to organize a special department for the treatment of diseases of the Eye and Ear; a large and important service rapidly developed and has been maintained until the present time. It remained under the care of Dr. Heyl and myself until 1883; when on my resignation Dr. B. Alexander Randall, then my Associate in private practice, was appointed Ophthalmic and Aural Surgeon to the Hospital, a post he filled with great industry and success for many years. After his resignation the present incumbent, Dr. G. Oram Ring, then my Assistant Surgeon at the Wills Hospital, was appointed, and has placed in literature many valuable contributions gleaned from the abundant material in the Episcopal Hospital wards and clinic.

Numerous other special clinics were opened at various Hospitals and Dispensaries throughout the City:—at the German Hospital, April, 1881, under Dr. Charles S. Turnbull, where he served as Oculist and Aurist until his resignation in 1914, assisted by Dr. Wm. T. Shoemaker, now in the service in France, and Dr. Edward A. Shumway; at the

Pennsylvania Hospital under Dr. George C. Harlan.

An additional and very important adjunct to the teaching and progress of Ophthalmology not only in our City but throughout the Country was the organization of the Philadelphia Polyclinic and College for Graduates in Medicine, early in the Eighties. Upon its staff of teachers we once more find the names which already have appeared in these annals in connection with the teaching foundation of the University of Pennsylvania, the Jefferson Medical College and the Wills Hospital. This Institution was well equipped for courses of Instruction in all branches of Medicine and Surgery by well known teachers. In Ophthalmology there was the large out-of-door service to furnish illustrative material for clinical teaching and this, together with didactic instruction by men widely known brought large classes of Post Graduate students from all parts of the United States, and added greatly to the renown of our City as a center for Ophthalmic teaching. Among these teachers may be mentioned R. J. Levis, John B. Roberts, two of the founders of the School, H. F. Hansell, Wm. M. Sweet, B. Alexander Randall, Edward Jackson, George E. de Schweinitz, Wm. Campbell Posey, Wm. Zentmayer, James Thorington, T. B. Schneideman, Wendell Reber, whose death we have so recently mourned, and the Author of this History, who had a corps of Assistants to aid in giving a carefully arranged course covering the field of Ophthalmology; the clinical feature of this instruction being given also at the Wills Hospital with his Hospital Staff assisting, consisting of Dr. G. Oram Ring, Dr. John T. Carpenter and Dr. James Thorington, the latter conducting also the out-of-door Clinical Service at the Polyclinic and giving instruction in refraction and retinoscopy.

With these must be considered the group of Surgeons who have served at the Wills Hospital as successors to those whose names appear in its early annals, —and who have maintained its reputation as a Mecca for the afflicted and its renown as a school of Ophthalmology and should therefore appear in this an-

nal, Dr. Conrad Berens, Dr. Frank Fisher, Dr. Charles A. Oliver, Dr. Edward Jackson, Dr. William Zentmayer, Dr. William Campbell Posey, Dr. McCluney Radcliffe, Dr. S. Lewis Ziegler, Dr. Paul Pontius, Dr. P. N. K. Schwenk, Dr. Wm. M. Sweet, Dr. Burton Chance, Dr. T. Milton Griscom and the Author of this History who served from January first, 1890, to July, 1917, at which time he tendered his resignation. Added to these are the names of the faithful and able younger men who have as Assistant Surgeons and Clinical Clerks aided their respective Chiefs in the work of the large Clinical Service.

On April fifth, 1893, the College of Physicians of Philadelphia adopted the following resolution: "Whenever fifteen fellows of the College shall, in writing, certify to the President their desire to have organized a section upon some department of Medical Science or practice, he shall, if in his judgment it seems wise, direct the Secretary of the College to announce the creation of such a Section." In accordance with this resolution the Secretary announced the creation of a Section on Ophthalmology, which appears on the notice of the College Meeting for May third, 1893,—dated April 27th, 1893: of its signal value I need not comment to this Company.

I have avoided any detailed analysis of the excellent and painstaking work of this large group of younger men, many of whom are present, not because the enticing temptation to do so did not present itself, nor for any want of appreciation of the great value of their contributions as having accomplished a distinct progress in our knowledge, but for the reason that the work is too recent for historical perspective. The things upon which we now set value because they seem to us to be true, may not be so regarded by a succeeding generation of observers. Our science is not a mathematical one. Then too, if indeed they prove to be true they will gain increasing lustre with the flight of time. It may be safe, however, to briefly outline the subjects which seem to your historian worthy of record as having been pressed forward in our City.

Of primary importance among these

are:—(1) The claim that the Emmetropic Eye must be regarded as the standard or model eye by which all other states of refraction are to be compared. (2) The genesis of the Myopic Eye. That it was not due to faulty hygiene in the schools, but to congenital anatomic defects in the eyes of the children. Hence that no child should enter upon school life until the eyes had been examined and these congenital anomalies excluded or corrected, and that out of this discovery a steadily diminishing percentage of myopia has been effected. And furthermore, out of these deductions grew the school examinations now so universally adopted. (3) The insistence by Philadelphia Ophthalmologists that the static anomalies of Refraction should be corrected under the painstaking employment of cycloplegics. In this connection should be included the painstaking work of Dr. Edward Jackson and Dr. James Thorington on refraction methods and especially in perfecting Retinoscopy, simplifying its application to the daily routine, and placing the procedure on an enduring mathematical basis. (4) The intimate relationship between affections of the Uveal Tract of the Eye and systemic diseases of the infectious, toxic and nutritional types which affect *pari passu* the cardiovascular tree, the kidneys and glandular system.

That the Uveal disease leading to the impairment or disordered nutrition of the eye stood in intimate etiologic relationship to ocular maladies leading to impaired function:—As for example degeneration of the vitreous body, opacity of the crystalline lens, increased tension of the globe. Our present understanding of the conditions thus briefly outlined has been gained step by step; here a little and there a little, now and again glimpses of the truth, fortified and extended by numerous and continued painstaking observations until they became accepted as the foundations for practice and have largely been gained through the published original observations of members of this College. As in Astronomy the observations of a Copernicus, a Kepler, and a Galileo were required before the discoveries of Leverier or the generaliza-



tions of a Newton were possible; so in Ophthalmology, many things in the realm of bacteriology and pathologic histology, with the significant role played by anatomic anomalies over the function of the eye, were to be discovered before we could rest upon the generalizations of the present.

#### BOOKS ON THE EYE.

It is highly fitting that to this general statement of progress in our City should be added some reference to the permanent literary work emanating from the pens of Philadelphia Ophthalmologists. (1) Early among these productions was a valuable article on "Medical Ophthalmology" by Dr. Wm. F. Norris, in "A System of Medicine" edited by Dr. Wm. Pepper and published in 1885 which was followed by (2) "Systematic Text Book on Diseases of the Eye" by Dr. Wm. F. Norris and Dr. Chas. A. Oliver. (3) A Text Book by Dr. George E. de Schweinitz which has passed through many editions each with careful revision and extensive additions to meet the rapid advance in Scientific Ophthalmology. (4) A large treatise edited by Dr. Wm. C. Posey and Dr. Wm. G. Spiller on "The Eye and the Nervous System" appeared 1906. Among the many contributions appeared the following articles by Philadelphia Ophthalmologists:—"Peripheral Affections of the Fifth, Seventh and Cervical Sympathetic Nerves," Dr. Edward Jackson; "Neuroses and Psychoses," Dr. George E. de Schweinitz; "Neuroses Occasioned by Eye Strain; Headache, Neuralgia," Dr. Samuel D. Risley; "General Nervous Disorders Caused by Eye Strain," Dr. Howard F. Hansell; "Exophthalmic Goitre," and "The Physiological Effects of Operation of the Eyes," Dr. Wm. Campbell Posey. (5) "A System of Diseases of the Eye" edited by Dr. Wm. F. Norris and Dr. Charles A. Oliver; an extensive work comprised in four large quarto volumes constituted by requested articles prepared by men in many countries, each of whom had won wide recognition by extended observation and research in the special field to be covered in his contribution to the "System"; thus comprising an authorita-

tive statement of Scientific Ophthalmology to the date of publication.

Many Philadelphians, twelve in all, are contributors to these volumes. Dr. George C. Harlan, "Diseases of and the Plastic Surgery of the Eye-lids"; Dr. John A. Ryder, "Embryology-Development of the Eye Ball"; Dr. George A. Piersol, "The Microscopical Anatomy of the Eye Ball"; Dr. Edward Jackson, "The Dioptrics of the Eye" and "Retinoscopy"; Dr. Wm. Thomson and Dr. Carl Weiland, "Normal Color Perception and Color Blindness"; Dr. I. Minis Hays, "Blindness, Its Frequency, Causes and Prevention"; Dr. Joseph McFarland and Dr. Samuel S. Kneass, "The Microorganisms of The Conjunctiva and Lachrymal Sac"; Dr. Samuel D. Risley, "School Hygiene"; Dr. Wm. F. Norris, "The Diseases of the Lens"; Dr. Chas. A. Oliver, "Ametropia, Its Etiology, Course and Treatment"; Dr. George E. de Schweinitz, "The Toxic Amblyopias." In addition several of the articles by foreign contributors are translated into our language by Philadelphia Colleagues; Dr. William Zentmayer and Dr. Thomas H. Fenton. There is also the valuable treatise on "Muscular Anomalies of the Eye" by Dr. Howard F. Hansell and Dr. Wendell Reber, published in 1908, which has passed to its second edition with revision and extension in 1912.

Thus briefly I have traced the Rise and Progress of Ophthalmology as a special branch of Medicine and Surgery in Philadelphia. Your Historian has been deeply impressed by many circumstances during the progress of his study but chiefly by his faulty memory of events which came under his observation and regrets that he had not kept a journal. If he were a sculptor desiring to idealize history, he would not depict a mythical female figure seated upon a globe with pen and scroll recording events as they transpire—but rather a mystic, virile figure—standing at the land's end, his feet lapped by the ebbing tide, his eager expectant face aglow with the purple and gold of the closing day and with silver trumpet to lips. Calling! Calling! Calling into the darkening mists:—Calling to deaf ears for an answer from lips, Alas! forever still.



# A COMPOSITE OPHTHALMIA NEONATORUM LAW.

BY THOMAS HALL SHASTID, LL. B., M. D., F. A. C. S.

SUPERIOR, WIS.

In the writer's article for the American Encyclopedia of Ophthalmology, Vol. IX, p. 7138 ("Legal Relations of Ophthalmology") occurs this passage: "Among the most important of the first named enactments are those relating to the prevention of blindness from *ophthalmia neonatorum*. These are of Cleopatra-like variety—long, short, foolish, wise, and every one imperfect.... There is...scarcely a single law which does not show forth some valuable provision. On the other hand, there is scarcely a statute which does not exhibit some serious hiatus or fundamental misconception of the situation which it is the object of the law to improve. Some statutes place the entire matter in the hands of the State Board of Health. Others are founded wholly upon the mistaken supposition that blindness from the disease in question is forever due to a fault on the part of an ignorant midwife. Others require, and properly, that physician or midwife, whichever has been in attendance at the birth, shall report all cases of 'inflammation of the eyes' to a public official—for example, 'the parish health officer,' the drawer of the bill having apparently believed that, the case once 'reported,' the eyes would get well of themselves. The most important provision of all is, in fact, almost universally omitted—i. e., the provision that whoever presides at a birth—whether midwife or physician—*shall use the Credé drops*, and thus render unnecessary the making of any sort or kind of report or the institution of any sort or kind of treatment."

It has lately seemed to me that, inasmuch as the situation is precisely as reported above, and inasmuch as, furthermore, to my knowledge, no scientific or legal committee, or even an official of any legal or medical association has taken any step or steps looking toward

the securing of efficient and uniform legislation concerning the disease in question, that I myself would venture (with however much of diffidence) on the drafting of a law which should meet, as far as I could make it do so, the actual requirements of the situation, and which, furthermore, should in greater part be compounded of the best of all the features to be found in the present laws in the various states of the Union.

I therefore present hereunder, in full detail, not indeed what I should have the temerity to entitle a "model" ophthalmia neonatorum law, but a *composite* ophthalmia neonatorum law, in which, so far as reasonably possible, the very language now of one and now of another section of some already existing law is made use of, and I earnestly entreat from the readers of the JOURNAL their candid and thoughtful attention to the proffered draft—to the making of which I have given much time and care. If I regarded the study of the legal side of ophthalmia neonatorum as merely an amusing speculation, I would not, in these days of heavy business and sorrow, have occupied the time either of myself, or of any others, with it. At all events, our present ophthalmia neonatorum laws, fragmentary and hastily constructed as they are, for the most part

"Play such fantastic tricks before high Heaven  
As make the angels weep."

## PROPOSED FORM OF LAW.

*An Act for the Prevention of Blindness, Imposing a Duty Upon All Physicians, Midwives, Nurses, or Other Persons Having the Care of Infants, and Also Upon Health Officers, and Fixing Penalties for the Neglect Thereof.*

Section 1. Be it enacted by the people of the State of ——— Represented in the General Assembly:<sup>1</sup> That any dis-

(1) The title of the act and the enactment clause should be made to conform to the requirements of the individual state.

eased condition of the eye or eyes of any infant in which there is any inflammation, swelling or redness in either one or both eyes, either apart from or together with any unnatural discharge from the eye or eyes, at any time within two weeks after the birth of such infant, shall, independently of the nature of the infection, be known as ophthalmia neonatorum.

Section 2. It shall be the duty of all physicians, midwives, nurses, or other persons in professional attendance upon a birth, to instil, in all cases, into the eyes of the infant (excepting only if it shall be stillborn) one of the following prophylactic preparations against ophthalmia neonatorum, and in the manner indicated:

1. Two drops and no more of a one per cent solution of nitrate of silver in distilled water, kept in a dark amber, or dark blue, bottle, and not more than three days old.

2. Two drops of a twenty-five to forty per cent solution of argyrol, absolutely fresh.

Two drops of a twenty-five to forty per cent solution of protargol, absolutely fresh.

In every case the prophylactic is to be instilled into both<sup>2</sup> eyes, and, if possible, within one hour after birth. The lids must be held apart, and the medicine dropped upon the eyeball between the lids.

Section 3. Should the eyes of any infant become afflicted with ophthalmia neonatorum (as above defined) it shall be the duty of all physicians, midwives, nurses, or other persons having charge of such infant, to report, within six hours after the discovery of such disease, to the local health officer (or if there be no local health officer then to the State Board of Health) the fact of such disease, stating the names of the parents, their address, and the age, and, if possible, the

name, of the infant. And, if the person in charge be a physician, he shall, forthwith, notify the parents of such infant, or anyone standing *in loco parentis* to such infant, of the danger to the eyes of such infant and of the necessity for skilful and continued treatment, of the contagious character of the disease, and of the proper methods for preventing contagion. In case the person in charge is not a physician, it shall be the duty both of such person and of the local health officer, or the State Board of Health, immediately upon the receipt of the report to him or them, to notify the parents of said infant, or anyone standing *in loco parentis* to said infant, of the danger to the eyes of said infant from the disease in question, and of the necessity for skilful and continued treatment thereof, of the contagious character of said disease and the proper methods for preventing contagion. And if the parents of such child shall not be able to pay for medical services, they shall be directed by the health officer to place the child in charge of the city or township physician.

Section 4. Upon receipt of a report of a case of ophthalmia neonatorum, the local health officer shall immediately write on the report the date and hour of the receipt of the report, together with his own signature, and shall make a permanent record of the case for the use of the local health department. The original written report shall be thereafter forwarded at once by mail to the State Board of Health.

Section 5. Every physician, midwife, or other person in professional attendance on a birth, shall state plainly on the birth report what preventive for ophthalmia neonatorum was used, and within how many minutes or hours it was used after the complete birth of the child.<sup>3</sup>

(2) A physician who brought to me a case of ophthalmia neonatorum (for the existence of which he was himself, as accoucheur, responsible), expressed sincere surprise when informed that the prophylactic ought to have been instilled into both eyes. He had thought, he said, that the drops, placed in one eye only, would be absorbed sufficiently to render the entire system immune, etc. A statute can hardly be too specific.

(3) The Vital Statistics Law (or the Resolutions of the State Board of Health which are made under the authority conferred by such law), should require that all births be reported within, say, forty-eight, or seventy-two, hours. This, is, in fact, done by the Resolutions of the Wisconsin State Board of Health.



Section 6. Every physician in this State who shall treat<sup>4</sup> any infant's eyes for ophthalmia neonatorum, shall, within forty-eight hours after said physician ceases treatment of or attendance upon such case of ophthalmia neonatorum, report to the local health officer (or, if there be no local health officer, then to the State Board of Health) the fact that said physician has treated a case of such disease, giving names of parents, or any person standing *in loco parentis*, stating when the presence of the disease was first observed, when the first treatment was given, when the last treatment was given, that he has now ceased treatment of the case, or attendance upon it, and what the condition of the infant's eyes was when last he saw them. And such local health officer shall send a copy of such report to the State Board of Health within ten days from the receipt of the original of such report by him.

Section 7. The State Board of Health shall furnish, free of cost, to physicians and midwives, registered under the laws of this State, such of the prophylactic substances mentioned herein as it may deem best for the prevention of ophthalmia neonatorum, together with such instructions as it may deem necessary for the proper administration of the same, not in conflict with any of the provisions of this Act.<sup>5</sup>

Section 8. To carry out the provisions of this act there may be expended annually from the treasury of the State a sum not exceeding \_\_\_\_\_ thousand dollars.

Section 9. It shall be the duty of all maternity homes and all hospitals or other places where women resort for purposes of childbirth, to post and keep posted in conspicuous places in their institutions, copies of this Act, and to instruct persons professionally employed

in such homes, hospitals and places, regarding their duties under this Act, and to maintain records of cases of ophthalmia neonatorum in the manner and form prescribed by the State Board of Health.

Section 10. All reports and records made under this Act shall be kept from the public, and shall be privileged information, except only in criminal prosecutions.

Section 11. It shall be the duty of local health officers and of the State Board of Health to report any and all violations of this Act to the prosecuting attorney of the district wherein such violation may have been committed, and to assist such official in every way possible, such as by securing necessary evidence.

Section 12. Any misstatement or concealment of any facts which, under this Act, are essential, shall constitute a misdemeanor, and any person, on conviction thereof, shall suffer the same penalty as is hereinafter provided.

Section 13. Any person violating any of the provisions of this Act shall be guilty of a misdemeanor, and shall, upon conviction thereof, be fined not less than ten dollars, nor more than one hundred dollars, or be imprisoned in the county jail for three months, or both so fined and imprisoned, in the discretion of the court.

Section 14. It shall be the duty of the state's attorney of the district in which any violation of this Act shall be committed, to prosecute for such violation.

Section 15. Whereas, about thirty per cent of all blindness is caused by ophthalmia neonatorum, and whereas the disease may always be prevented, and almost always cured in its incipency (its damage to the sight being therefore due, as a rule, to ignorance or carelessness); and whereas an emergency exists, therefore this law shall be in force immediately after its passage and approval.

(4) When the prophylactic has been used, and properly, there is, of course, no need for any treatment. But the prophylactic is far from being always and properly employed: hence the necessity for this and certain other sections of this Act.

(5) It would seem to be wise to allow to the State Board a right to choose the preventive which it will furnish. The person in professional attendance on the case, however, should himself be allowed a certain latitude of choice—i. e., as among the three preventive solutions above-mentioned.



## DEVELOPMENT OF THE ANTERIOR CHAMBER IN THE HUMAN EYE.

(Sullo Sviluppo Della Camera Anteriore Nell'Occhio Umano.)

PROF. SPECIALE-CIRINCIONE, ROME, ITALY.

Abstract-translation from *Annali di Ottalmologia e Clinica Oculistica*, 1917, pp. 161, 249, by William H. Crisp, M. D.

The study of the formation of the anterior chamber in man has not often been attempted, and has never hitherto been completed, since the data reported are more or less fragmentary, do not establish the period at which the formation of the anterior chamber commences, and do not at all explain the mechanism by which it makes its appearance.

The necessity of using the material for other researches has led to the use of a technic in which alcohol in various concentrations is employed for hardening the eyeballs. This results in wrinkling of the tissues, so that the preparations thus obtained are incapable of giving an exact criterion as to the conformation of the anterior chamber in the various stages of fetal development.

Speciale-Cirincione has therefore resorted to the freezing of small very fresh eyeballs, so as to leave unchanged the relations of the various parts. Since this method renders the preparations unsuitable for other researches he has made parallel preparations by the ordinary technic (fixation in corrosive sublimate or in Zenker's fluid, and graduated hardening with alcohol, from ten percent to absolute).

One essential part of the study is that relating to the development of the parts limiting the anterior chamber and especially the iridic angle. It is precisely in this region that researches on human fetuses have been very scarce. The paper by Speciale-Cirincione describes the salient points of nine very recent human embryos of the second, and nineteen of the third month, six different stages of the fourth month, five of the fifth, eight of the sixth, six of the seventh, ten of the eighth, and twelve stages of the

ninth month and to term.. The article is illustrated by a number of beautiful microphotographs, mostly in colors, tracing the various stages of development of the anterior chamber as a whole and of the adjacent parts.

The formation of the anterior chamber is closely connected with the development of the cornea, of the ciliary muscle, of the tissue of the iridic angle, of the iris, and of the pupillary membrane. Of all these parts nothing exists in the first month of embryonic life. At that time the ectoderm situated in front of the optic vesicle shows merely those modifications which lead to the formation of the crystalline vesicle, and when this has already been closed off and then separated from the ectoderm, the latter remains in front of the crystalline vesicle, being in contact with it for a short extent (embryo of 14 mm.).

At the beginning of the second month, there is insinuated between the crystalline vesicle and the ectoderm a layer of large cubic elements, derived from the undifferentiated mesenchyma which surrounds the margin of the optic vesicle; and thus is established a complete separation between the ectoderm and the anterior pole of the crystalline vesicle. This layer of cubic elements (*lamina endothelialis*), is the first sign of the future deep layer of the cornea. At this stage there are no elements between the ectoderm and the *lamina endothelialis*.

At a slightly more advanced stage of development (embryo of 20 mm.), there is differentiated in a circular fashion, around the primitive *lamina endothelialis*, a thickening of the mesenchyma formed of elements resembling those of the *lamina*, but disposed in several layers, covering the edge of

the optic vesicle. This circular thickening around the lamina endothelialis is called by the author the "endothelial cushion" (in the Italian original "cercine endoteliale," for which the Latin equivalent "pulvinus endothelialis" is here suggested). It has considerable importance in the later development of this region of the eye, since in front of it develops the cornea, while beneath it develop the ciliary body and the iris.

In the same embryos is found, in front of the endothelial cushion and exactly between it and the ectodermic covering of the eye, a short and narrow area of loose mesenchymal tissue in which the elements are sparse and whose nuclei are disposed quite regularly and parallel with the cushion. In embryos a little more developed this loose tissue extends uniformly in front of the cushion and the endothelial lamina, giving rise to the substantia propria of the primordial cornea. At this stage the cornea measures 0.68 mm. in diameter.

The tissue beneath the pulvinus (cushion) which hitherto formed a single mass not differentiated from the primitive mesenchyma, shows in the embryo of 20 mm. a difference from the surrounding tissue, in that it becomes less compact and its elements are often roundish. In section it appears in the form of a triangular area, limited in front by the endothelial cushion, externally by the margin of the optic vesicle, and internally by the anterolateral surface of the crystalline vesicle. The triangular area contains the section of a large vessel of capillary structure, which will later constitute the large arterial circle of the iris. Throughout this triangular area are further encountered numerous other vessels, of which a part, after being insinuated between the endothelial lamina of the cornea and the surface of the crystalline vesicle, constitutes the anterior vascular membrane, already complete in embryos of 28 mm. Other minute vessels take origin from the anterior aspect of the triangular area, together with a few mesenchymal elements, and are continued behind the margin of the vesicle

with the posterior vascular capsule of the lens.

Up to this time (the beginning of the tenth week), the margin of the optic vesicle shows few modifications. The completely pigmented external layer has become thicker next to the margin, while the internal layer has remained thin. The whole margin is in contact with the surface of the crystalline vesicle, which tends to become invaginated within the cavity of the secondary optic vesicle. In the successive stages (embryos of 30 to 35 mm.), there is observable a rapid growth of the wall of the optic vesicle, the result of which is the formation, near the margin, of folds which gradually become more numerous and deeper with an accompanying slow displacement of the margin of the vesicle in front of the surface of the crystalline lens.

As the margin of the optic vesicle advances toward the anterior pole of the crystalline lens, it leaves behind the endothelial cushion, and with it the periphery of the cornea, which thenceforward is no longer in correspondence with the margin of the vesicle, but extends further outward, overlapping the margin of the vesicle to the extent of the thickened part of the pigmented layer already referred to, and finishing where the pigmented layer again becomes thin (embryos of 34 to 35 mm.). Between the endothelial cushion and the folds of the pigmented layer is found at this time a dense stratum of mesodermic tissue very rich in vessels, which forms the beginning of the ciliary mesenchyma. The triangular mesenchymal area of the preceding stages is continuous with this ciliary mesenchyma and forms the portion of it nearest to the crystalline vesicle.

When the preparations are not properly treated, one may find at this stage (middle of the third month), the crystalline vesicle separated from the cornea; but there is no doubt that when this condition is demonstrated, we have to do with an artificial product, due to the contraction of the tissues or to mechanical displacement of the crystalline vesicle within the ocular cavity.

Thus are to be explained the findings of Rochon-Duvigneaud, Gabrielides, and Jannulatos, who describe a deep anterior chamber as existing at this stage.

During the third month of embryonic life the difference of extent between the cornea and the opening of the vesicle continues very slight. In embryos of 20 to 30 mm. the cornea measures 0.80 mm., while the opening of the optic vesicle measures 0.73 mm. In embryos of the end of the third month (86 mm.), the cornea measures 2.9 mm., while the opening of the vesicle measures 2.8 mm. The pupillary opening during the third month is thus the same size as the cornea.

The crystalline vesicle, which at first filled a large part of the optic vesicle, by developing more slowly than the latter, remains proportionally smaller. By this time the preterminal or ciliary tract of the optic vesicle comes to be in relation with the equator of the lens, while the margin of the optic vesicle lies between the periphery of the cornea and the anterior border of the crystalline lens. The preterminal or ciliary tract corresponds to the ciliary body and the marginal tract to the primitive iris. The iridic mesenchyma is covered toward the corneal surface by a layer of elements analogous to those of the endothelial lamina of the cornea, which, like the lamina, are continued into the cushion (pulvinus). This endothelial layer of the iris, however, is arrested near the attachment of the pupillary membrane.

The connections between the cornea and the iris become weak where they are covered by the two endothelial layers, one of which constitutes the deep covering of the cornea, and the other the covering of the iridic stroma, so that these are easily dissociated and there is then produced between them a narrow fissure which is filled with a hyalin substance. This fissure may be considered the first beginning of the formation of the anterior chamber, which at this early stage is constituted solely of a space placed in the form of a ring around and in front of the large arterial circle of the iris.

Remembering the more rapid development of the sclerocorneal membrane in relation to that of the crystalline lens, it is easy to understand how the latter structure, becoming relatively smaller, becomes more widely separated at its equator from the scleral membrane and from the limbus, while on the other hand it maintains its intimate contact with the cornea in the whole pupillary region, either because there the curvatures of the cornea and of the crystalline lens differ but slightly, or because the adhesions formed by the pupillary membrane are more solid at this time.

The gradual removal of the equator of the crystalline lens from the sclera and from the limbus determines necessarily the separation of the iridic stroma from the endothelial lamina, favored by the fact that there the two tissues are completely distinct and furnished with an endothelial covering. But the separation stops in the ciliary stroma because there a double endothelial covering is lacking, and on the other hand the pulvinus or cushion acquires solid connections with the stroma.

The penetration of a liquid into this fissure is merely a consequence of and is to be regarded in relation with the presence of the large arterial circle of the iris, which lies precisely beneath this fissure. From this circular vessel comes the liquid which fills the primitive anterior chamber, and this liquid is merely a transudate. This hypothesis is paralleled by the mechanism of formation of the canal of Schlemm, in which may be exactly followed the process of delamination which goes on between the superficial layers of the endothelial cushion.

In fact, a little while after the formation of the primitive fissure of the anterior chamber (in the first half of the fourth month), there appear one or more spaces situated in front of the endothelial cushion, at the boundary between the more superficial layers of the cushion and the scleral layers. It is worth noting that in the lumen of the canal of Schlemm, in distinction from what is found in the primitive fis-



sure of the anterior chamber, there are frequently encountered red globules, although this finding is not constant.

At the end of the fourth month we have therefore the cornea well developed, with a deep lining formed centrally of the endothelial lamina and peripherally of the endothelial cushion. The ciliary body is morphologically well distinguished by its rich mesenchyma and the characteristic folds of its covering. The compact crystalline lens assumes the aspect which is later proper to it. The canal of Schlemm has also already been formed. It may be said in short that the whole anterior segment of the globe is already completely outlined in its essential parts. Merely the iris, and with it the anterior chamber, are relatively very rudimentary.

Towards the middle of the fourth month the distance between the two opposite sides of the large arterial circle of the iris (to which corresponds the sinus of the anterior chamber), is 4.1 mm., while the distance between the two opposite borders of the optic vesicle is 3.86 mm. The little iris has therefore merely a width of .14 mm. It presents at this time, in correspondence with the pupillary margin, a little strip of epithelium (sphincter muscle), and a stroma. At this stage the anterior chamber maintains the aspect of a circular fissure and measures 0.13 mm.

From the fourth month onward, during the fifth, sixth, and seventh months, the ocular fissure with which the anterior chamber commences gradually increases in size, corresponding with the increase in surface of the iris. Thus it reaches 0.70 mm. at the end of the fourth month, 0.80 mm. at the end of the fifth month, 1.5 mm. at the end of the sixth month, and 1.9 mm. at the end of the seventh month. The pupillary membrane is at this time still adherent to the endothelial lamina of the cornea. During the sixth and seventh months the adhesion is however so delicate that separation of the crystalline lens from the cornea is possible by the mere fact of the use of alcohol, which accounts for the great difficulty of ob-

taining at this stage eyeballs in which the pupillary membrane is not detached from the cornea, at least over extensive areas. Thus are explained the results of Seefelder and Wolfrum, who placed the complete development of the anterior chamber in man in the sixth month of intrauterine life.

At the beginning of the eighth month the pupillary membrane shows a diminished richness in vascular loops; which are completely lacking in the central portion, corresponding to the anterior pole of the crystalline lens. The lamina which serves as a support to these vessels presents at this period a finely granular aspect and is hard to stain. It is not difficult to find obliterated vessels which are undergoing hyalin degeneration. Toward the middle of the eighth month, in fact, one sometimes finds complete absence of the pupillary membrane, with the result that the anterior chamber, from a circular fissure, is transformed into a complete fissure in the form of a negative meniscus in front of the iris and the crystalline lens, which have become entirely separated from the cornea.

The anterior chamber during the last month of fetal life is complete, but always very shallow, corresponding to the marked convexity presented by the iridic surface and the crystalline lens at these stages. It is only after birth that the anterior chamber becomes deep. Then the anterior aspect of the crystalline lens becomes flatter while the difference of curvature between the cornea and sclera steadily becomes more pronounced.

The trabecular system of the adult human eye is directly derived from the endothelial cushion which is encountered from the beginning of the third month. Some time after the end of the third month the more superficial layers of the pulvinus or cushion are separated by the penetration between them of minute scleral lamellae, and between the superficial lamellae there are produced small spaces which constitute the small spaces of the canal of Schlemm. Slightly before birth the elements of the pulvinus become flat-

tened out and constitute an endothelial covering to the trabeculae which have developed during the last part of fetal life in the form of fibrils in the pulvinus.

At birth the apex of the pulvinus corresponds to the circumference of the elastic membrane of Descemet, the anterior surface corresponds to the canal of Schlemm, and the periphery to the circular scleral layers, while the posterior surface corresponds in one

part to the anterior chamber (iridic angle), and in the other part to the ciliary muscle. Thus the sclerocorneal trabecular system is distinguished into two parts, one in relation with the sclera, whose circular lamellae are interlaced with the lamellae of the trabeculae, and the other part in relation with the ciliary muscle, whose fibers are continued in the form of tendinous elements with deeper lamellae of the trabecular system.

## OCULAR MANIFESTATIONS OF SPIROCHETOSIS ICTERO-HEMORRHAGICA.

(Les Manifestations Oculaires de la Spirochetose Ictero-hémorrhagique.)

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Abstract-translation from Archives d'Ophthalmologie, v. 35, No. 11, p. 647, by M. W. Fredrick, M. D.

The frequent occurrence of this disease in the field, especially in the trenches, has led to a more intense study of it. It appeared in the Belgian army in August, 1916, and the first cases in the French army were described by Martin and Petit in October, 1916. It invaded the armies on both sides in an almost epidemic form. Although the general symptomatology has been described in numerous publications the eye manifestations have received but passing notice. As few oculists and civilian physicians have had an opportunity of getting acquainted with this disease the authors give a short sketch of its prominent characteristics.

The disease does not always present the same picture; on the contrary, it is polymorphic, varying greatly especially as to severity. Certain symptoms, however, are always present, which allow a positive diagnosis. The usual clinical picture is this: the patient, while in full health, is surprised by chills, headache, pains in the body, pains in the muscles, especially those of the neck, lumbar region, flanks, posterior aspect of the thighs, and legs. Sometimes there is hyperesthesia of the

skin, and the eyes pain when they are moved. The temperature rises rapidly to 102° or 104°, where it remains for five or six days. During the first period there is great depression, the pulse is small and weak, but not greatly accelerated; the blood pressure is lowered. Nasal and labial herpes, frequent epistaxis, moderate bronchitis with bloody sputum, a dry, dirty tongue; repeated vomiting of bile. Diarrhea is rare, the stools being, as a rule, formed and colored with bile. Liver and spleen show but little swelling. Traces of albumin and large quantities of urobilin are constantly found in the urine, cylindrical casts are exceptional. About the fourth or fifth day the icterus appears, sometimes light in color, sometimes deepening into a dark yellow or saffron. Soon after the appearance of the icterus the temperature drops to near normal, and the patient improves in every way, except that the urine still retains the abnormal constituents, and besides shows biliary pigment.

After five or six days of apyrexia the temperature again rises, and describes a regular curve with wide daily oscillations during a period of six or seven



days. This recurrence of fever is better borne than the first period, and during its course the icterus disappears. A long convalescence follows, five to six weeks passing before the blood returns to normal. Cardiac collapse is always to be feared. The mortality ranges from four to eight percent.

Towards the end of 1914 the causal organism was first described by Japanese authors (Inadu, Ido, et al.). It is a spirocheta morphologically related to the spirocheta of syphilis, and was first found in coal miners. This discovery threw much light on the etiology of the disease, which had been known clinically for many years under different names: "ictère fébrile à rechute de Mathieu"; "typhus hépatique de Landouzy"; "Weil's disease"; etc. In those cases in which the icterus does not occur the diagnosis can be made by inoculating guinea pigs with the blood of the patient during the first seven days of fever, or by examining the sediment of the centrifuged urine passed after the tenth day, when the spirochetæ will be found. The fifteenth to twentieth day the spirochetæ will be numerous.

In fifty cases of spirochetosis icterohemorrhagica the authors found:  
No ocular manifestations. .... 4 cases  
Simple hyperemia of the anterior segment of the eye... 29 cases  
Congestion of the iris. .... 7 cases  
Iritis ..... 6 cases  
Iritis and optic neuritis. .... 2 cases  
Iritis and retrobulbar neuritis. 1 case  
Ocular herpes ..... 1 case

The hyperemia is an early symptom, and varies much in intensity. Except in the severe cases, in which there is tearing and photophobia, the patients are not much annoyed by the eye condition. Both ciliary and conjunctival bloodvessels are involved. The hyperemia does not call for any special treatment, as it disappears spontaneously about the time convalescence begins. In the severe cases the instillation of a few drops of atropin is generally sufficient to cause a subsidence of the symptom.

Iridic irritation and iritis are, as a rule, coincident with the recurrence of

the fever, sometimes they are late symptoms. In the iridic irritation we have double myosis with unequal pupils due to the difference in the amount of irritation present in the two eyes. This inequality of the pupils sometimes reverses itself. The pupils dilate slowly under atropin, and when dilatation has attained the maximum the anisocoria disappears. Iritis with exudation into the posterior chamber occurred eight times, was generally of a mild character and ended in a complete restitution. Real synechiae are rare. One feature of this iritis is the ease with which the exudate in the posterior chamber can be seen, owing to the small amount of infiltration into the iridic tissue and the thinness of the posterior synechiae, as contrasted with the findings, for example, in syphilitic iritis. Atropin acts much more promptly in the cases under consideration than in other cases of iritis, for the reasons just given. The deposit on the anterior lens capsule, consisting probably of fibrin, disappears slowly, but is completely absorbed finally.

The conditions described in the preceding pages seem to the authors to prove the presence of the spirochetes in the uveal tract. The instillation of atropin for four or five days is advisable, even though most of the cases tend to spontaneous cure.

Of the two cases of optic neuritis one was bilateral. The fundus changes, while not severe, were readily recognizable. There was some lessening of vision, but no retraction of the fields, nor was there a central scotoma. Both cases resulted in a complete cure. The one case of retrobulbar neuritis terminated favorably also in a short time. The authors think the presence of the spirochetes in the cephalorachidian fluid was the causative factor. The one case of ocular herpes occurred early in the disease, and affected the lids, conjunctiva, and cornea. The icterus of the conjunctiva is a part of the general picture, and has, therefore, no local significance. In three cases subconjunctival hemorrhages were seen, being situated towards the inner and outer canthi in both eyes. In no case



was a hemorrhage into the deeper tissues or into the orbit observed. The case reports of five cases are given in detail.

(It is of interest to note that the finding of the Japanese investigators that

the field rat is the probable carrier of this infection has been confirmed by Stokes, Ryle, and Tytter, [Lancet, Jan. 27th, 1917], and by Eggstein, [J. A. M. A., Nov. 24th, 1917].

(M. W. F.)

## A NEW OPERATION FOR PTOSIS.

ERNEST E. MADDOX, M. D. BOURNEMOUTH, ENGLAND.

Abstract with two illustrations from the British Journal of Ophthalmology, v. 1, No. 6, p. 358, by Charles H. May, M. D.

Few will dispute that ptosis operations, however successful they may be reckoned surgically, rarely quite realize an artist's ideal from the esthetic point of view. Nearly all procedures which attack the levator do so from the skin side, which mode of approach must make for esthetic loss, owing to derangement of so many important structures—skin, areolar tissue, orbicularis, orbital fascia and the extensive strands from the levator. Maddox contrasts this with the simplicity of approach from behind as practiced by Bowman: After double eversion of the eyelid, division of the conjunctiva along the upper margin of the tarsus brings the tendon in view and this can then be shortened without interfering at all with the natural beauty of the front of the eyelid. Mr. Bowman's operation was dropped because too difficult and because the excision of a large piece of the tendon left the door open for possible disaster if the suture should cut out and allow the lid to drop worse than ever.

Bowman excised the posterior or upper edge of the palpebral cartilage

ting out of sutures nor are the structures connected with the anterior face of the tendon interfered with.

The operation is described as follows: The only special instrument required is a fine mouse-toothed conjunctival forceps to the tip of one leg of which has been soldered an oval strip of metal transversely. Adrenalised cocain affords ample anesthesia. After effecting the first ordinary eversion the second eversion is made by grasping the extreme apex of the tarsus with the lid evertor, so that the metal plate shall lie against the tarsus, which is then everted the second time, and maintained in position by the weight of the instrument as it lies upon the brow. The whole field of operation thus lies fully exposed. The conjunctiva is now divided along the upper margin of the tarsus. This is most easily done by transfixion with a narrow Graefe knife, after which a pair of scissors reflects the conjunctiva from the tendon so as to leave it fully bared. Its fibres are then seared, with an electro-cautery, in longitudinal furrows from the tarsus to as high up as the case requires.

A central bundle of tendon fibres is grasped with forceps and transfixed by a ring of thread and two similar sutures are placed on either side of the first. Next the apex of the tarsus is to be snipped off with scissors (though for a small effect this can be dispensed with), and the two needles of the central suture, either with or without an intermediate dip into the tendon, are passed solidly through the tarsus side

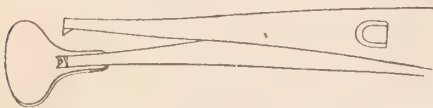


FIG. 1.

Conjunctival Forceps showing Addition of Metal Plate. (Maddox.)

with about half of an inch of the levator inserted into it. Maddox's operation also approaches the tendon from behind but omits excision of the tendon and there is therefore no risk of cut-

by side, not too near its cut edge, from the conjunctival surface to the deep surface, and the needles brought out between the parallel threads, so that the knot, when the suture is tied, shall be sunk behind the upper edge of the tarsus without touching the cornea.

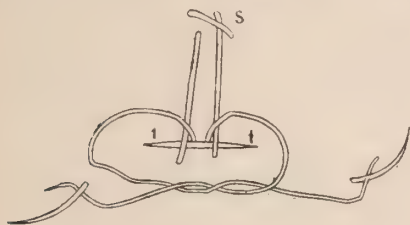


FIG. 2.

Central Suture Before Being Tied. S, Double Turn in Tendon. t, t, Cut Edge of Tarsus. (Maddox.)

Before tying, however, the two lateral sutures are passed through the tarsus

similarly, and then all are knotted. Two or three fine sutures to replace the conjunctiva complete the operation. The sutures are left undisturbed for two or three weeks and then easily withdrawn, but with as little stretching of the tendon as possible. The full effect of the operation is sometimes not obtained for three or four months. The final result is generally very pleasing.

No purely posterior operation is, of course, available in the congenital absence of a levator; but in acquired ptosis it always does some good, since even if the levator be completely paralyzed, the mere elasticity of the tissues working against the orbicularis counts for something. A posterior operation can, if necessary, be supplemented by an anterior one, such as Pagenstecher's sutures, to bring the frontalis into play as well.

### SHORT ABSTRACTS.

Under this heading are included notices of the most important points of interest that appear in the recent literature which are capable of brief statement. For the systematic review of the whole literature of each subject the reader must consult the "Digest of the Literature," a part of which appears in each number of the journal, and which will be complete within the year. The initials appended to each abstract are those of the collaborator who made the abstract; abstracts made by foreign collaborators or by contributors whose names are not published in the list of collaborators are signed with the abstractor's name.

**Lang, William.**—**Etiology and Treatment of Iritis.**—(The Lancet, June 23, 1917, p. 956.) In opening the debate on this subject, the writer pointed out the great advantages which would accrue from the discovery of the cause of iritis in each instance. He had ascertained that in 200 cases of iritis in his private practice the various causes occurred in the following percentages: syphilis, 6; gonorrhea, 12; tubercle, 11; general affections, 8.5; other causes, 25.5; pyorrhea, 37. At one time syphilis was regarded as the chief cause of iritis, and probably hospital figures would show an increase on 6 per cent; but with the modern antisyphilitic methods, he thought it would become the rarest cause, for gummata of iris and ciliary body could be made to melt away without the disorganization of the eye which was formerly seen.

Gonorrhea was not usually considered so potent a cause, but hospital practice would probably show a higher percentage than 12. Until recently Mackenzie's work on gonorrheal iritis had remained unimproved upon. Now, however, that the infection had been shown to linger in the genito-urinary system for years relapses could be largely prevented by local treatment applied in that region. Other sources of infection might complicate the cases of iritis, such as pyorrhea, and produce relapses. The tuberculous cases of iritis were equally divided between the sexes, and the average age of the patients in this form was 25 years, all but two being between 16 and 25 years of age. The treatment of tuberculous iritis, as for tubercle of the lung, appeared to be good air, graduated exercise, and food rich in fats, as well as such local meas-

ures as would subdue inflammation and prevent closure of the pupil.

Of the cases 17 were associated with gout, diabetes, herpes of the fifth nerve, influenza and pneumonia. Ten patients had some septic focus on the skin or on a mucous membrane or cavity. In 6 cases there was disease of tonsils, and 23 patients had an affection of the alimentary tract, while 7 had a diseased condition of the genito-urinary system. One case followed a smart blow on the eye, and another patient had iritis as a sequel of sympathetic ophthalmia.

In no less than 74 of the 200 patients the sole cause found was pyorrhea. When these cases were seen early and the offending stumps or teeth were removed the clearing up of the iritis was strikingly rapid. Of the remaining cases 22 had pyorrhea in association with other diseased conditions. In the cases in which pyorrhea alone was found there were twice as many women as men. Of the total number 48 per cent had their mouths affected, and it would be of great value if members of the dental profession could recommend a preventive of this appalling state of affairs, which seemed to lay the foundation for numberless diseases involving all parts of the anatomy, including the eye.

C. H. M.

**Lapersonne, F. de.—Antityphoid Vaccine and Ocular Lesions.**—(*Archives d'Ophthalmologie*, v. 35, No. 11, p. 449). Can antityphoid vaccine produce eye troubles leading up to blindness? A certain number of cases in which this is supposed to have occurred have been recorded, but the author thinks they have little scientific value. Some of them are due to added infection with staphylo-, strepto-, or pneumococci, due to a faulty technic or a latent infection in the subject. In such cases one may find severe purulent irido-cyclitis, necessitating the removal of the eye. In a syphilitic or a rheumatic subject one may have a recurrence of an irido-cyclitis coincident with the injection, such as one often sees in tuberculous subjects after injections of

tuberculin, or after the ocular reaction to tuberculin, or as one sees in syphilitic subjects after the injection of the arsenical preparations.

Such is also the case when a secondary glaucoma asserts itself after the use of the vaccine, as the author cannot understand how the vaccine can produce such a result a month or more after the injection, especially when the injection was not followed by a rise in temperature. A primary glaucoma may make its appearance at the same time as the injection is given, but the causal connection is just as doubtful as in the case of a secondary glaucoma. The conclusion arrived at by the author is that an ophthalmoscopic examination should precede the injection of the antityphoid vaccine, and that syphilitics, arthritics, and tubercular subjects should not receive the injection, especially when they are more than thirty-five or forty years old.—M. W. F.

**Shahan, W. E.—Corneal Thermotherapy.**—(*American Journal of Ophthalmology*, Nov., 1917, p. 321). The writer refers to experiments which he made on lower animals in studying the effects of high temperatures upon the eye and which he reported at the 1916 meeting of the A. M. A. He continued these experiments and studied especially the effects of higher degrees of heat upon pneumococcus ulcers of the eyes of rabbit. Next he applied this knowledge to the treatment of corneal ulcers in man.

Up to the present time, thirty-two cases of serpiginous ulcers of the cornea, hypopyon keratitis of pneumococcus origin, have been treated and the results have been so uniform and positive, that the method can be said to be very nearly specific. There was rapid cessation of clinical symptoms and steady replacement of destroyed tissues, and the visual acuity finally obtained in these cases ranged from perception of light where very nearly the whole of the corneal surface had been destroyed before the thermal treatment was used to full normal where the treatment was used before the onset of severe iritis.



The mode of application is as follows: After anesthesia and bleaching by means of several instillations of 5 percent cocain in 1:2000 adrenalin, the applicator is placed upon the corneal ulcer and held there one minute. The extremity of the applicator should be of a size to cover the ulcer exactly; it is heated exactly to 158 degrees F. by a special contrivance. There will be no pain during the application but there will be some for a few hours afterwards.

C. H. M.

**Masuda.—Acute Disseminated Chorioiditis with Scrofuloderma.**—(Nippon Gankakai Zasshi, January, 1917).

In a fifteen year old scrofulous patient, who likewise had hemorrhagic nephritis, there was a suppurating lymphatic gland of the neck, which had partly cicatrized and had given rise to

typical scrofuloderma in its neighborhood. Chemosis and swelling of the eye-lids appeared on each eye, which was accompanied by dull pain. Ophthalmoscopic examination showed pale yellowish spots, which were more or less round, and a few of which were the size of the papilla. These spots were not accompanied by pigment and lay under the retinal vessels. They were more frequent in the equatorial zone leaving the neighborhood of the papilla and macula free. The affection was more pronounced in the R. eye than in the L. It was interesting to note that the fundus disease appeared and proceeded with the swelling of the eyelids. The author thinks that this form of chorioiditis has not yet been described, and calls it acute disseminated chorioiditis with scrofuloderma.

KOMOTO.

## SOCIETY PROCEEDINGS.

### SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

OCTOBER 18, 1917.

DR. S. LEWIS ZIEGLER, Temporary Chairman.

#### Operation for Contracted Socket.

Dr. P. N. K. SCHWENK showed a case of contracted socket in which he devised a new feature of transplanting a flap with a pedicle. The first step was a canthotomy. The conjunctiva was then undermined to the margin of the lower lid, and the skin loosened 6 mm. downward. The conjunctiva was brought into the cavity and held there by two hairpin sutures through the lower lid and tied over two pearl buttons. A large flap twice the width of the denuded conjunctiva was taken and placed in the orbit, suturing the lower part of the flap to the lower edge of the conjunctiva and the upper part to upper edge. The flap was placed into the canthotomy angle, then the ends of canthotomized lids were united over

the pedicle by a strong hairpin suture tied over a pearl button. The edges of the area from which the flap was taken were then united and a conformer was inserted. The sutures were allowed to remain seven or eight days.

#### Relation Between Eye and Ear as Shown by Bárány Tests.

DR. ISAAC JONES and DR. H. MAXWELL LANGDON said that knowledge of the relation between the ear and the eye was first recognized in 1825, when Fleurens noticed that excision of portions of the labyrinths of animals caused ocular movements and disturbances of equilibrium. At the same time, Perkinge produced nystagmus and vertigo by turning human beings. Robert Bárány has elaborated and made practical application of the field of knowledge thus opened.

The ocular mechanism depends on ear stimuli for precision of movement and steadiness of fixation. Impulses from the right ear tend to draw both eyes to the left and impulses from the left ear tend to draw both eyes to the right. Interference with the normal

functioning of the ears results in nystagmus. Bartels makes the statement that in rabbits ocular movements depend entirely upon stimuli from the ears and section of the acoustic nerves produces complete loss of eye movements.

It is now definitely known that the ear consists of two organs of distinct and separate function: the cochlea, which is the organ of hearing, and the vestibular labyrinth, which is the sense organ of balance. The balancing portion of the ear consists of two tiny sacs known as the utricle and saccule, and of three semicircular canals. The utricle recognizes movements in an antero-posterior direction and the saccule movements in a lateral direction. The semicircular canals detect rotary movement of the body in all planes.

The new ear tests consist of stimulation of these semicircular canals by either turning the patient in a chair, douching the ears with hot or cold water, or by the use of the galvanic current to the ears, producing a rhythmic nystagmus and vertigo; for example, turning the individual ten times to the right in twenty seconds, with the head upright, stimulating both horizontal semicircular canals, produces a horizontal nystagmus to the left, subjective sensation of turning to the left and "past-pointing" to the right. (By past-pointing is meant the inability to find with the eyes closed a spot, which the finger has previously touched, the arm being kept stiffly extended, having been raised above the head and again lowered.) Turning in a chair produces these phenomena by mechanically causing a movement of the lymph in the canals. Douching with hot or cold water produces this circulation of the lymph by changing its specific gravity.

Based on a study of several hundred clinical cases and a considerable number of operations and autopsies, it is believed that the following are the pathways over which these stimuli are transmitted to the eyes to produce the nystagmus and to the cerebrum to produce the vertigo.

Drs. Langdon and Jones have brought out certain facts in regard to these pathways, some of them definite, others needing further analysis. Our present belief, in fact, is as follows:

1. The fibers from the horizontal semicircular canals pass through the VIII nerve, enter the brain-stem at the junction of the medulla oblongata and pons and continue directly to Deiters's nucleus and there divide into two pathways.

- (a) The vestibulo-ocular tract concerned in the production of the nystagmus. These fibers go from Deiters's nucleus to the posterior longitudinal bundle, through which they pass to the various eye muscle nuclei, from which through the III and IV nerves they are distributed to the eye muscles themselves.

- (b) The vestibulo-cerebello-cerebral tracts responsible for the vertigo. From Deiters's nucleus this path enters the cerebellum through the inferior cerebellar peduncles to the three vestibular cerebelli nuclei of the same side, from which it proceeds upwards through the superior cerebellar peduncle and continues to the cerebral cortex from both sides, but more particularly the opposite side, through the crura cerebri. The cortical areas which receive these fibers are postulated by Mills to be in the posterior portion of the second temporal convolutions, adjacent to the cortical areas for hearing.

2. The fibers from the vertical semicircular canals have a very different course; after passing through the VIII nerve they immediately ascend into the pons and at a point above the middle of the pons they have a division into two pathways similar to the division of the horizontal canal fibers at Deiters's nucleus.

- (a) The vestibulo-ocular tract, the fibers entering the posterior longitudinal bundle, to be distributed to the eye muscle and finally to the eye muscles themselves.

- (b) The vestibulo-cerebellar-cerebral tract reaches the cerebellum through the middle cerebellar peduncle, entering the cerebellar nuclei of the same

side; from this point the pathway is identical to that of the fibers from the horizontal canal, through the superior cerebellar peduncle to the cerebral cortex of both sides.

The internal ear and these intracranial pathways constitute our conception of the "vestibular apparatus," and a knowledge of this is of use to the ophthalmologist in the study of ocular palsy and spontaneous nystagmus.

#### **Epithelioma of Lid and Cheek, Methods of Cure.**

DR. G. ORAM RING exhibited a male patient, aged sixty-five years, from whose lower right lid he had removed an extensive epithelioma by ordinary surgical means, the denuded area having been covered by an epithelial graft from the forearm.

The operation was performed fifteen years ago. The grafts adhered perfectly and the lid remained normal in appearance until two months ago. The cicatricial ectropion now present is the outcome of a plaster treatment applied by a so-called "cancer doctor" to an epitheliomatous splotch on the cheek, which developed about eight years ago after the lid operation. The splotch referred to had been treated by an expert roentgenologist for several years, mainly by X-rays and for some months with radium, to no purpose. The plaster accomplished the eradication of the disease in two months when well-known forms of radiant energy had failed after several years of trial, but with an unfortunate cicatricial contraction of the lower lid.

The ingredients of the plaster were arsenic, sulphur, eupatorium feniculoides, or dog fennel, and ranunculus, or crowfoot. The quantities and method of application were detailed. Dr. Ring's purpose in presenting the case was not to advocate the use of the plaster, notwithstanding its merit, but to insist upon a less dogmatic adherence for so long a period to a method which had clearly failed.

A prompt and satisfactory result could have been accomplished in Dr. Ring's judgment, by the application of the method of electrothermic desicca-

tion, with which the profession in Philadelphia has been made familiar, especially by the work of Dr. W. L. Clark. It was felt that the bloodless devitalization of malignant disease of the type referred to could be accomplished with promptness, certainty and precision by the desiccation method, thereby minimizing the cicatricial complication.

DISCUSSION—Dr. William L. Clark said he appreciated the invitation to discuss the respective merits of the various methods practiced for the treatment of epitheliomas. His experience, covering a period of ten years, had been such that he had formed well-defined conclusions upon the subject.

The methods considered were operative surgery, chemical caustics, thermocautery, roentgen rays, radium and the desiccation methods. The class of epitheliomas were confined to those of basal cells or rodent ulcer type, especially those appearing upon the eyelids and adjacent parts. The keynote of success, so far as permanency of cure is concerned, was the thorough destruction of the local lesion by whatever means employed, by one treatment, for he considered it folly to allow any malignant tissue to remain after starting treatment, for there was danger of stimulation of the growth by so doing.

Nothing more was necessary in the class of epitheliomas under discussion, as they are of relatively low-grade malignancy, progress slowly, and seldom if ever metastasize. Another factor of importance, in addition, is the cosmetic result, and in choosing a method for the treatment of a given case the one that combines an equal chance of cure together with a good cosmetic result should be selected.

Operative surgery is efficient if performed radically, but the cosmetic result leaves much to be desired. Secondary plastic operations often improve this condition, but more often fail. Operative surgery has the added disadvantage of opening blood and lymph channels, favoring recurrence. The best argument against operative surgery in the treatment of these



lesions is the fact that cases are being continually referred for other treatment by the highest exponents of the art of ophthalmic and general surgery.

The use of chemical caustics, such as nitrat of silver, phenol, etc., is most reprehensible, as they serve only to stimulate the growth. Pastes of arsenic or zinc chlorid are often successful, however, when used by physicians experienced in their use; but the results are by no means constant, and even in the hands of experienced men, failures are frequent. The reason for the failures can be readily seen. The depth of destruction cannot be accurately determined, and if one malignant cell is left remaining, recurrence is certain. The application is painful, there is danger of applying pastes on the eyelids, and there is frequent unnecessary scarring. When a good result was obtained it was a matter of luck.

Thermocautery is superficial in action, tends to stimulate the lesion and produces a contracted scar. Its use should be condemned. This applies either to the thermocautery or electrocautery.

The roentgen rays are successful in a fair percentage of cases, and when they are successful the result is ideal, both from a curative and cosmetic standpoint. The results, however, are by no means constant, and from Dr. Clark's own experience and observations from the experience of the best roentgenotherapists he believed that there was a tendency to recur in a large percentage of cases sooner or later unless treated very early. It also has been observed that when the roentgen rays are used to the limit and fail that the tissues are in worse condition than before treatment, and because of this lowered vitality, less amenable to other treatments. More than one X-ray treatment is usually required, and often the lesion is stimulated instead of retrogressing. There is also some danger to the eye in treating epithelioma of the lids.

The same objections apply to radium as to the X-rays, although often good results are obtained by them both.

The desiccation method is one which

embraces the advantages of all and has none of the disadvantages of the methods mentioned. The X-rays and radium may, however, be used in some cases in conjunction with desiccation to advantage. It destroys the lesion thoroughly to any depth desired, and the control is so accurate that the smallest discernible point may be treated without danger, even on the cornea. Lesions may be destroyed with one treatment, blood and lymph channels are sealed at once, and there is no resultant contracted cicatrix. There is a minimal amount of destruction of normal tissue. The percentage of recurrence computed from 150 cases of epithelioma of the eyelids, one year or more, is less than 3 per cent.

From a curative and cosmetic standpoint, Dr. Clark believed that there was not doubt that the desiccation method is far superior to any method known at the present time for the treatment of basal-cell epitheliomas of the eyelids and adjacent parts.

J. MILTON GRISCOM,  
Clerk.

## COLORADO OPHTHALMOLOGICAL SOCIETY.

November 17th, 1917.

DR. EDWARD JACKSON, Presiding.

### Glaucoma Secondary to Perforating Corneal Ulcer.

DR. G. F. LIBBY presented a boy of 12, first seen by him 7½ years before on account of a suppurating ulcer of the right cornea, with hypopyon and iritis. The ulcer had perforated, healing slowly under the usual treatment, with a resulting leucoma adherens.

The child was not seen again until Nov. 2, 1917; and then only by chance. No history of further ocular disturbance was recently obtainable from his father. Examination revealed a thin leucoma in a cornea 13 mm. in diameter as compared with 11½ mm. for the fellow eye, pupil moderately dilated, deep anterior chamber, the old anterior synechia absent, two pigment deposits on the capsule, clear lens and vitreous, with a deeply excavated optic

nerve, showing gray atrophy. To palpation the tension seemed to be normal or slightly lowered. A week later the tonometer registered 15 mg. of Hg. R. V. = barely light perception. L. V. =  $5/4$ .

The patient has been a delicate, hypersensitive child; and although fairly well at present, is of the substandard type. The eye is quiet except when disturbed by manipulation or exposure to intense light.

DISCUSSION.—Dr. D. A. Strickler asked if the anterior synechia were extensive in this case. Dr. Libby answered in the negative. The anterior synechia were successfully broken up by atropin.

Dr. J. A. Patterson said this case was perhaps not easily managed, and the patient may have continued the atropin too long after healing of the perforating injury, especially since the case was not seen for  $7\frac{1}{2}$  years.

Dr. E. M. Marbourg spoke of one case he has seen in which the atropin broke up such adhesions very easily.

Dr. O. Orendörff asked when the vision had failed, also whether or not the glaucoma was congenital.

Dr. G. F. Libby replied that the glaucoma is not congenital as the cornea had a normal diameter for each eye, and the two eyes were equal when he saw the patient  $7\frac{1}{2}$  years ago. He knew that repeated examination of this boy  $7\frac{1}{2}$  years ago then absolutely excluded glaucoma. He furthermore stated that the atropin was stopped at the close of the inflammation following the perforating injury and could not have been used by the patient after stopping treatment. However, the di-onin was continued for some time afterwards.

Dr. Jackson said he would watch to see what the eye will do, until the period of hypertension is over and the overgrowth of the eye is at an end. The boy is now too old for buphthalmos. If the disease is not progressive, he would let it alone. If it becomes progressive at any time, or shows at the end of six months that it is progressive, he would operate. Eserin

should be used, even if the tension is normal or subnormal. There may be intermittent rise of tension.

### Retinal Arteriosclerosis.

Dr. J. A. McCaw presented a man, age 58, who formerly had a blood pressure of 180, and a few casts in the urine. The blood pressure has been reduced to 168. When first examined in the clinic, he had large and small retinal hemorrhages, seen as a rosette.

DISCUSSION.—Dr. Edward Jackson said he found new formed retinal vessels when he examined this patient at the clinic.

### Vision After Congenital Cataract.

Dr. EDWARD JACKSON presented a boy of fifteen who had suffered from congenital cataract, operated on when he was about 10. By repeated operations, a fairly clear pupil was obtained in the left eye, with some small areas of fundus reflex in the right. He had lateral nystagmus of 2 or 3 mm. He was wearing right and left + 8 Sph. lenses, which gave him light projection in the right eye and vision of 0.08 in the left. It was considered improbable that further operations would improve his vision. However, by giving him + 18 Sph. lenses, mounted one inch in front of the cornea, he was able to read type, visible to the normal eye at 0.75 m.; that is, type about as small as he would encounter in newspapers or books. The points emphasized were: the poor vision often obtained in cases of congenital cataract, because of other defects in the eye; and the great practical benefit, even with poor vision, of properly adapted lenses.

DISCUSSION.—Dr. J. A. Patterson said these cases need further help by refraction. He spoke of a case operated upon by the late Dr. Noyes, of New York City, while the patient was a babe. He saw the patient in early manhood. He had a limited field, but this improved by compelling him to use his eyes.

Dr. F. R. Spencer spoke of a young man who had been very successfully operated upon by Dr. D. H. Coover for congenital cataract, and who obtained



normal vision with his correcting lenses, although he had never been able to wear toric lenses satisfactorily, as these gave him poorer vision than the plano-convex lenses.

In closing the discussion, Dr. Jackson said the field of vision should be developed early in life; but we should not operate until the child is 1 or 2 years old. He said this boy is keeping up with his class in school even under these difficulties.

### Extreme Conical Cornea.

Dr. JACKSON presented a young man, age 20, who had good sight until 8 or 9 years old. Then, after severe pneumonia, his vision failed. He was wearing lenses that gave vision R. 0.3 and L. 0.003. In the right eye,  $+2$ . Sph.  $\ominus$   $-7.50$  Cyl. ax.  $80^\circ$ . V. = 1.1. With the left eye,  $-30$ . Sph. gave V. = 0.04. The curvature of the central part of this cornea was fairly spherical, corresponding to 80 D. of refraction or over. The anterior chambers were both very deep, and the left cornea somewhat nebulous. This patient has a sister whose vision had failed after illness at the age of 18. Her left eye showed extreme concavity of the cornea. For her right eye, she wore a  $-7$ . Cyl. ax  $70^\circ$ , or within  $10^\circ$  of that required for her brother's eye.

DISCUSSION.—Dr. J. A. Patterson asked if there is any myopia in the family, to which Dr. Jackson replied in the negative. The myopia, he stated, followed acute illness. In reply to Dr. McCaw's inquiry concerning the tension, he stated the tension had been normal with the fingers, and it could not be taken with the tonometer on account of the high corneal curvature.

Dr. O. Orendorff inquired about debilitating illness prior to the development of conical cornea. He stated that he had had three cases of conical cornea in the past year: One was a ranchman without previous illness; the second, a hotel proprietor, whose general health is absolutely perfect with no history of previous illness; and, the third case is that of a robust girl, without any history of previous illness. She has had slight myopic astigmatism, but

has not been subjected to eye strain which would make this increase to the point where she should develop conical cornea.

Dr. F. R. Spencer mentioned a young man of 18 or 19, a university student, whom he had under observation 9 or 10 years ago, and in whom the conical cornea in each eye followed typhoid fever. He has had, during the past year, under observation a young lady who has conical cornea of one eye which followed pneumonia.

Dr. Edward Jackson said most of these cases have disturbed nutrition, and that is the underlying cause of the projection of the cornea forward.

### Chronic Uveitis with Opaque Nerve Fibers.

Dr. EDWARD JACKSON presented a boy of 13, whose eyes became painful and inflamed 14 months before. He was treated in a distant city, no cause for the inflammation being found, except disease of the tonsils, which were removed. His right eye presented a clear cornea, a gray iris, slightly greenish as compared with its fellow eye, many posterior synechia, and deposits in the area of the partly dilated pupil. The lens was clear, the vitreous chamber hazy. Around the optic disc was a narrow ring of white, which broadened out and down, extending a whole diameter from the disc. This region was hyperopic, 10 D. The white patch gave the appearance of opaque nerve fibers, showing no pigment at the edges, or in any part. In the choroid were found a few small, round spots of partial atrophy, one of which was slightly pigmented. There were still smaller dots, like those of "retinitis punctata albescent," and one light streak, such as may be left when a floating retina becomes reattached. At the extreme periphery of the fundus, in all directions was seen a grayish-white area without pigment, not much elevated. At one point below, retinal vessels passed on to it, but the retina was nowhere floating. Transillumination was good in all directions. Tension of the eyeball was 13 (14mm.). The left eye was normal in all respects; tension 10



(24mm.). During the two months he had been under observation, vision in the right eye had increased from perception of moving shadows to 0.01.

DISCUSSION.—Dr. F. R. Spencer asked if this was a case of congenital coloboma, as he did not have an opportunity to examine this patient. Dr. J. A. Patterson asked about the relation between the acute tonsilitis and uveitis. Dr. Jackson replied that they were probably opaque nerve fibers. The uveal inflammation subsided after the tonsils were removed.

### Optic Atrophy of Traumatic Origin.

Dr. F. R. SPENCER presented Mr. J. O. K., first examined February 19, 1917. Age 40. He gave a history of having been run over by a wagon wheel when 8 years of age. He was rendered unconscious and remained so for two days. He had hemorrhage from the mouth, nose and ears. Since then his vision has gradually failed, so that at the present time V. O. D. is 6/30-1 and J. No. 7 at eight inches. V. O. S. 1/60 with peripheral field and not even J. No. 14. The anterior segment of each eye is practically normal, except that the left pupil reacts to light consensually only. The right reacts well to both light and accommodation. Examination of the fundi revealed very pale discs, especially over the temporal half with distinct edges and atrophic cupping. The left disc is very white. Fields are greatly contracted. Blood and spinal fluid Wassermann are both negative. The cerebro-spinal fluid showed no leucocytosis and its globulin test was also negative. A physical examination of the nose and throat has failed to reveal anything to account for his optic atrophy, and an X-ray examination of the sella, hypophysis, and accessory sinuses of the nose is also negative, but it does show the old basal fracture. His general health is perfect, except that he has suffered from nervous prostration during the past 2 or 3 years, but is much better now.

Diagnosis:—Primary optic atrophy of traumatic origin. This is almost complete in the left eye and partial in

the right. V. O. D. August 2nd, 6/20 and V. O. S. 2/60.

DISCUSSION.—Dr. E. M. Marbourg spoke of seeing an artilleryman who had sustained a fracture at the apex of the orbit. He had hemorrhages and edema of the optic nerve head. An examination of the disc showed typical optic atrophy.

Dr. J. A. Patterson said many of these cases are due to an injury of the nerve by spicules of bone, and by hemorrhage, with pressure against the nerve fibres.

Dr. D. A. Strickler spoke of a man who was cleaning a boiler and was struck with a heavy iron rod. He sustained a fracture of and hemorrhage into the orbit. He also mentioned another case which became suddenly blind, following an injury.

Interstitial Keratitis.—A further report upon Dr. J. A. Patterson's case of interstitial keratitis, presented at the October meeting of this society, was as follows: This patient has received treatment both for tuberculosis and syphilis, with quite decided improvement, although he is not entirely well to date.

Dr. F. R. Spencer emphasized the importance of treating patients, when two diseases are present, for both diseases if we are to expect the best results.

### Dislocation of Lens.

Dr. E. M. MARBOURG reported a man whose vision failed 5 years ago. Five days ago he had recurrent attacks of pain with redness of the right eye, and the lower edge of the lens was slightly tilted forward and opaque. The pupil was dilated. Eserin contracted the pupil promptly. In 3 days he had another attack. The tension was 55 by the tonometer. Transillumination was negative. No foreign body could be found and the lens and iris were not tremulous.

DISCUSSION.—Dr. C. E. Walker said the capsule in this case has given away in all probability, and openings to the canal of Schlemm are blocked at one point. He would remove the lens in

this case in order to reduce the increased tension.

Dr. F. R. Spencer said an X-ray should be taken to see if by any possibility there is a piece of steel lodged in the eye.

Dr. J. A. Patterson said Sweet has emphasized that the X-rays shouldn't be too penetrating if we expect to find a small foreign body in the eye. Too penetrating rays make us overlook a small foreign body.

FRANK R. SPENCER,  
Secretary.

## CHICAGO OPHTHALMOLOGICAL SOCIETY.

October 15, 1917.

DR. PAUL GUILFORD, President, in the Chair.

### Hereditary Upward Coloboma of Iris. Other Hereditary Conditions.

DR. CLARENCE LOEB stated that although coloboma of the iris could not be justly classed among the very rare ocular malformations, it was not seen so frequently by any one man as not to excite interest. When it was bilateral and unaccompanied by any other developmental lesions, it was of additional interest. But when the lesion had an atypical location and a definite hereditary history running through five generations could be obtained, it certainly became worthy of being put on record.

Miss Z., a graduate nurse, was referred to him in January, 1917, for examination. He found that she had a bilateral coloboma as shown in the drawing which he had made. In the right eye, the defect was much greater than in the left. The remaining portion of the iris started just above the horizontal meridian, temporal side, curved downward and then upward to a point on the nasal side, slightly above that on the temporal. By transillumination, and looking far to the side, the margins of the lens could be seen in the area where the iris was absent, but the ciliary body could not be seen. Moreover the fundus was absolutely normal.

In the left eye, the pupil was extended upward and temporally by the coloboma almost to the periphery, in a position corresponding to about 2 o'clock. A thin edge of iris persisted at this location. In this eye also there was no lesion of the fundus.

The right eye was almost amaurotic, owing to a high degree of myopic astigmatism, while the vision in the left eye was quite good after correction of a small amount of myopic astigmatism.

The patient was a very intelligent woman and repeatedly assured the author that wherever the anomaly had appeared in her family, it had partaken of the same character as in her eyes, namely, bilateral, upwards, and more pronounced on the right than on the left. At the author's request, the patient obtained a detailed family history.

In this family there were instances of both direct and indirect heredity. Counting each affected parent and his children, whether affected or not, as a separate family, there were seven families containing 20 children, of whom 10, or 50 per cent, were affected. There were two families in which the parents were not affected and the children were likewise normal. Finally, there was a case of indirect heredity of one child through an unaffected mother.

In an investigation into the subject of hereditary diseases of the eye which the author made in 1908, he was able to collect the histories of 59 families of aniridia or coloboma of the iris. Out of 156 children, 116, or 74 per cent, were affected. This was a higher percentage than obtained in the family whose history he had just related. In addition, a search through the literature since 1908 had revealed other cases which were cited. If every affected parent was counted with his or her children as a separate family, there were 7 families showing a direct heredity. In these families, there were 22 children, of whom 12 were affected and 10 normal. In addition there was one family showing collateral heredity, 5 children; 2 affected and 3 not. He gave statistics of 10 families containing 30 children, of whom 19 were affected, and 11 not affected. If to these were



added the families and children in the case he reported, there was a total of 17 families containing 50 children, of whom 29 were affected. If the present number of families and children was added to the previous statistics, there were 76 families with a total of 206 children, of whom 70 per cent were affected.

It was thus seen that the anomalies of the iris were strongly dominant characteristics, tending to be inherited in about three-fourths of the children of a parent so affected. So far as the essayist knew, there had been no case recorded of the marriage of two parents with coloboma of the iris, consequently no statement could be made as to the effect of such a marriage upon the progeny. In cataract, however, the percentage was 60 per cent in the case of both parents affected, and 58 per cent in the case of only one, practically the same. In retinitis pigmentosa, the percentage was 50 per cent in the case of both parents affected, and 50.6 per cent in the case of only one, again practically the same. However, the number of families in both of these diseases where both parents were affected was so small that no definite judgment should be made.

**DISCUSSION.**—Dr. Francis Lane said that one usually thinks of coloboma of iris in the region of the cleft. After the lenticular vesicle has been formed and is covered with ectodermic structure, and the flask secondary to the optic vesicle has been born, the mesoderm grows from a portion of the optic vesicle which forms the cornea before the anterior chamber is formed. In this mass of mesoderm there is a slit in the connective tissue which forms the pupillary membrane on one side and the cornea on the other. This takes place before the iris grows out from the root of the ciliary body; then it is in close contact with it if the fissure is closed, but if there is failure of the fissure to close, one can understand why there is coloboma in that region. If there is failure of the separation of mesoderm which grows out later from this root between the lens and cornea, one can

understand why coloboma can be situated in any position.

Dr. Loeb, in closing, said the whole subject of the development of the coloboma of the iris, the choroid or optic nerve, has never been definitely accepted. Many theories have been advanced, but where one gets coloboma of the iris in five generations of the same general character, hereditary influence must play an unusually strong part in bringing about this form of developmental anomaly.

#### **Management of Squint.**

DR. ROBERT VON DER HEYDT read a paper on this subject, stating that from his observations on strabismus he would first exclude alternating squint; in which cases there was found good vision and fixation of each eye, but muscular imbalance of high degree, favoring alternating suppression of the images; also the well understood cases of squint in high hypermetropia where the accommodation necessary to overcome it brought with it an excessive convergence, and thus produced a periodic and later a permanent inward squint. These latter cases were promptly corrected by the early adjustment of correcting lenses to be worn constantly, thus correcting the refractive error, bringing about perfect fixation and fusion, therefore stereoscopic vision, and inhibiting the impending development of amblyopia in the converging eye.

It was the other kinds of squint that he wished to consider, the kinds that were less easily handled. The first three or four years of life present the critical period in which so much could be done to assist nature in establishing permanent ocular parallelism. This could only be accomplished by a thorough and early study of each case and its possibilities, based on a full understanding of the etiologic factors producing them.

About the more obscure cases it might be said in short that any factor present in one eye that retarded the development of fixation, or made it less accurate in that eye, as anisometropia, monocular high astigmatism, amblyopia or lowered visual perception in it



from any cause, would retard the development of fusion and make it impossible. The inability to learn fusion, because of the lowered fixation qualifications of one eye would not in itself necessarily give rise to a squint; it would only predispose. If, however, there was added thereto in the same pair of eyes a tendency to deviation from any cause, a muscle imbalance, the development of a strabismus was inevitable. Expressed in other words, the visual undervalue of one eye, plus a tendency toward deviation, would bring a squint. These cases were common, difficult to handle and, therefore, often neglected. Early attention was most important; delay favored the development of monocular vision, the one eye increasing its visual value by taking the work onto itself, the other learning more and more to suppress, with amblyopia ex anopsia gradually increasing the difference between the two eyes, until nothing more could be done to coax back the reduced visual acuity.

The first step in the proper handling of the case was to win the confidence of the child, so that a careful retinoscopy could be done under a cycloplegic. It was best to introduce the child to the darkroom at the time of the first visit and give a few flashes with the mirror which proceeding was, as a rule, sufficient to avoid future rebelliousness. When the retinoscope disclosed a sufficient refractive error to reduce visual acuity or hypermetropia calling for several diopters of accommodative effort, glasses should be given.

A period of sufficient length to enable the parents to teach the child the recognition of numerals was now allowed until the next visit. This was done whether glasses were given or not. This enabled one to make accurate records of the visual acuity of each eye, as on this factor was dependent the character of our efforts and by means of it we might measure progress in the management of the case.

The visual acuity of each eye with and without glasses, also how much that of the better could be reduced by a cycloplegic must constantly be borne

in mind for the purpose of intelligently studying the squinting eye, its possibilities, and later the improvement in it. The use of atropin in the good eye to force the use of the mate was an old practice, and the author pleaded only for the recognition of its limitations and its application in the selected number of cases which could be modified by this method. Results could only be obtained if one really forced the use of the bad eye; and one could only do so if one succeeded in making it temporarily the better eye of the two, by the cycloplegic's action on its mate.

What good would it do, for instance, to thus lower the visual acuity of the good eye for a period of months or years, as was often done, if in spite of this blurring it still remained the one with best acuity? Therefore, the necessity of studying the visual acuity of both eyes under various conditions.

If atropinization of the good eye was sufficient to make it the secondary eye, he ordered its use according to the calendar in the following manner: for instance, beginning January 1st a drop twice daily for three weeks, then stop and come in the last week of February. Resume March 1st for three weeks and continue in a like manner. If advisable, he deprived the better eye of its correcting lens during the atropin period and substituted a smoked lens. This called for the use of cycloplegics about half of the time (or even a longer period could be adopted), and made it necessary for the patient to make only six visits per annum. Parents would persevere, as a rule, if one made it reasonably easy for them.

He had, in some cases, continued the use of the monocular cycloplegia beyond the sixth year and during school time ordered homatropin on Saturday and Sunday. If these methods could not be adopted owing to the lower visual value of the squinting eye, some method of occlusion might be tried. He used periodically a hollow black patch with adhesive strips, so arranged that there could be no peeking. A definite schedule was given to be rigidly enforced.

In a case of convergent squint, in high hypermetropia existing for one and one-half years with marked amblyopia, by the use of atropin in the fixing eye for several years, according to the calendar system outlined before, he had measurably raised the visual acuity of the squinting eye and finally brought about parallelism.

Perseverance and the adoption of a definite system, if the latter did not impose too many duties upon the parents, would lead to surprisingly favorable results in the many cases so often left to permanent strabismus.

DISCUSSION.—Dr. Thomas Faith stated that the essayist began by speaking of fusion, but later spoke more of parallelism than anything else. There are many cases of squint that are corrected so far as parallelism is concerned, but the other two important things one ought to consider, namely, improvement in vision in the squinting eye and binocular vision are lost completely.

As to teaching children to recognize numerals, this can be done after a certain period, but in some of the cases that come early the ophthalmologist is obliged to try something else besides teaching numerals, in order to obtain a record of vision and be sure whether or not the patients are improving. He has tried some of Worth's ideas like every one else who is doing work of this kind. One idea that is particularly valuable is to remove the correcting lens from the fixing eye which is kept under atropin and compelling the patient to see with the squinting eye, and if possible ascertain the amount of vision in the two eyes with the idea of determining which is the working eye under the conditions. One thing to keep in mind is to get binocular vision if possible, and this can only be obtained even with the amblyoscope after the vision in the squinting eye has begun to improve.

Another thing: by the periodical use of atropin, if we can get the squint transferred from the squinting eye to the fixing eye, we are likely to succeed.

As to the use of the amblyoscope, he has used it with considerable satisfac-

tion and had adopted an idea that Dr. Schwarz is responsible for, that is, having patients use an amblyoscope at home. He has supplied a number of amblyoscopes in that way, and after the patients were through with them, he has taken them back at a reduced price, and turned them over to other patients at the reduced price, so that one does not lose anything, and the patients' expense is small. The greatest trouble the ophthalmologist has is to teach parents to do what he wants them to do; and to get them to take an interest in the case, aside from simply having glasses fitted. In young children, of two or three years, the thing to do is first to put on correction, then make a sort of game each day for the youngsters in having them hunt out something in the house with the fixing eye occluded. It is surprising what interest children take in it if parents will teach them. The parents can find out what a child is particularly fond of, the playthings it is fond of, hide them, and compel the child with the fixed eye to find them. By measuring the distance the child is from an object when he recognizes it and names it, you can obtain an idea what amount of vision the child has.

He has tried to use the little balls that Worth uses, but has not succeeded very well with them because if the child knows exactly what he is looking for all the time, there is no way of determining whether he sees enough to distinguish the little round sphere, or whether he guesses at it.

He has had something occur in the last year which upsets completely some of the ideas of fusion and improvement of vision, and so on, in squint. He has had under observation for three years and a half, a child who came when four years of age, who has been using the amblyoscope and has developed parallelism, binocular vision and improved vision in the squinting eye to 20/40 or 20/30. The child was going along nicely, and was for some reason not seen for a year. When he came back, in spite of the fact that he had parallelism, the squinting eye had degenerated in vision to 20/180ths. Still the



eye is so perfectly straight that one cannot discern any squint, and at the time he had seen the child a year previously, he was able to fuse with the amblyoscope and further than that, with a test he showed binocular vision.

Dr. Leigh E. Schwarz stated that he has found in certain cases, that a patient can run to the opposite side of the amblyoscope from five to ten degrees and still maintain persistently a certain amount of squint. In one case he reduced the squint to seven degrees, which remained at this point, notwithstanding the fact the patient fused by means of the amblyoscope ten degrees on the opposite side. He thought that was rather remarkable and interesting.

He recalled the case of a patient, three and a half years old when first seen, whom he had under observation for three years. At the beginning the patient had 20/200 in one eye, and 20/70 plus in the other, and twelve months later the patient got 20/30 plus in one eye and 20/30 minus in the other and has that at present. This case shows what can be done in raising visual acuity.

Dr. Von der Heydt, in closing the discussion, stated that his object in bringing up the subject was to emphasize the duty of the ophthalmologist towards these children. It is not enough to refract them, give them glasses, and bless them on their way, but the squinting eye must be followed. How one can measure visual acuity in a young child when it does not know numbers, he could not see.

The child should be taught numerals, and the average child, two or three years old, could be taught numbers.

As to the use of the amblyoscope, he could not conceive of one being able to so interest a child of the age mentioned with pictures. One might show children pictures, and many children will see the canary bird in the amblyoscope with one eye and nothing with the other. Another child may see the bird cage with the one eye and hardly a bird with the other, and how one can so influence a patient so young to draw a bird into the cage more than a few times with a child two or three years

old, he could not understand. He had never bought an amblyoscope and therefore he was quite neutral as to its value. The most promising type of cases were evidently those that have high astigmatism in one eye. He thought Dr. Faith tried to differentiate unnecessarily between the ability to develop fusion and parallelism. No doubt, they are two separate and distinct things. If we create parallelism, and fusion does not develop, there is nothing that can be done further, except to continue to develop the visual acuity of the bad eye by the methods he outlined in his paper.

The speaker recalled to mind another case of a child two and three-quarter years old, brought to him eight years ago with six and a half diopters of hypermetropia. The parents have refused to give the child glasses. He saw a picture in the papers of how this child had been wonderfully cured on State street recently. One could therefore see what becomes of these children, when they are neglected by their parents.

### **Sympathetic Ophthalmia and Other Forms of Uveitis.**

DR. E. V. L. BROWN presented specimens of three cases of sympathetic uveitis seen in this clinic during the past year; one of which followed a trephining, another a rupture of the margin of the cornea after a spontaneous thinning and ectasia, and the last a penetrating injury. Cases of ordinary fibrinoplastic and suppurative uveitis were shown; also specimens of cases of tuberculosis of the choroid, discrete tubercles, gummata of the iris, and disseminated chorio-retinitis from acquired syphilis.

### **Device to Immobilize the Head and Lids.**

DR. E. R. CROSSLEY stated that many forms of lid specula had been devised for controlling the eyelids during operative procedures on the eyeball, most of which depended upon the force of a spring of some character to retract the lids. All of these devices had their weakness in their frailty and the fact that the patient "can squeeze the eye-



ball itself" with the lids and actually throw the speculum out of the eye during operation.

With the ordinary forms of specula, the routine procedure before doing a cataract extraction, after placing the patient in position on the table, was to talk to him to get control and his confidence and attempt to exert a hypnotic influence on his mind. If he happens to be a good patient, the surgeon succeeds. If nervous and irritable, as most were, he might roll the head to one side at the critical moment, when the knife was through the anterior chamber, and interfere seriously with the incision or cause the operator to do serious damage to the eye with the knife, if he did not dexterously follow the movement of the head.

The most serious damage might come after the incision was completed and the anterior chamber was open. He might squeeze violently enough to throw out the lens and vitreous through the opening and lose the eye entirely. Then the patient was told that it was his own fault for he squeezed. This was not a true statement, for the act was largely involuntary on his part, and we, as operators knowing it to be such, were responsible and should take some positive means to control the patient so that such mishaps were impossible.

Undoubtedly this common accident had occurred to all who were doing an extensive amount of this kind of work.

In the presentation of this appliance for the immobilization of the head and eyelids during operations on the eyeball, the author offered a mechanical device that took complete control of the head and eyelids more efficiently than a trained assistant could possibly do.

With this head clamp and eyelid retractor, the operator could go to his operation with a feeling that no accident was going to occur to detract from his good results, and that he could positively assure his patient that he could not move and injure himself during the operation. This reassured his mind and inspired confidence in the operator, obtaining a perfect control of the situ-

ation that was impossible to obtain otherwise.

The apparatus consists of two parts, the base and the superstructure or framework carrying the lid hooks. It was described in detail and illustrated with four figures.

DISCUSSION.—Dr. Edward F. Garraghan said that he had practical experience last spring with the use of the apparatus exhibited in a cataract extraction and was surprised to see how efficient it was. There was no movement of the head whatever. He thinks every hospital should have such an apparatus and try it out.

Dr. Thomas O. Edgar stated that he recently had the opportunity to use the instrument in connection with the extraction of a cataract. He had seen Dr. Crossley use it in a number of cases at the infirmary, and in all such instances it immobilized the head and lids and prevented squeezing of the eyeball. It would be wise to have a little preliminary practice in the adjustment of the apparatus with particular reference to the carrier for the lid speculua, because in the instance in which he used it, the head was a little too low, so as to restrict somewhat one's working space. If attention is given to this, that feature will probably be overcome. The instrument should be especially valuable to those ophthalmologists who have not a regular and well trained assistant.

Dr. Oliver Tydings said it occurred to him that there was one defect in the instrument exhibited, and that was, the power to control the occipito-frontalis muscle. He could not conceive of any instrument, outside of the human hand, which could control the movement of this muscle in the use of a lid detractor. He asked Dr. Crossley in how many cases he had used it.

Dr. Crossley, in replying to the question as to the length of time he had used the instrument, stated that it had been used since last January. He did not know the exact number of cases in which it had been used. However, it had been used frequently and satisfactorily at the infirmary.

MAJOR WORTHINGTON, Secretary.

# American Journal of Ophthalmology

Series 3, Vol. 1, No. 1.

January, 1918

PUBLISHED MONTHLY by the OPHTHALMIC PUBLISHING COMPANY  
7 West Madison Street, Chicago, Ill.

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## EDITORIALS.

### OUR NEW JOURNAL.

Among medical and ophthalmic journals this one is counted new. But when we look closely into its various features, there is very little that is really new about it. Its name was used fifty years ago, and has been in continuous use for thirty-three years. Every one of its departments may be found in other journals. Its typography and make-up are imitations of points judged best in the journals merged to form it, or in the standard literary magazines of the day. Its original papers will be by writers who have been contributing to the American literature of ophthalmology. Its review and abstract departments deal with the same world literature as was available to our predecessors, but which is now diminished and impoverished by war. In only one thing is the journal new. It is a movement toward wider and more effective cooperation among the ophthalmologists of the greatest nation speaking a single language and enjoying the opportunities of modern civilization.

Even cooperation is no new thing in ophthalmic journalism. It has been a matter of cooperation from the start.

The writer, the editor, the publisher, and the reader are all necessary to make it worth while to begin or continue a journal. There has always been some cooperation between them. Each journal started has been designed to meet some opportunity and need for such cooperation; and to a certain extent each has succeeded in doing this. The passing of every one of the journals now merged will excite some regret on the part of readers, editors, and writers. Only when a larger, more general, more effective cooperation is brought about will such regrets be lost in the new satisfaction.

Some of the effects of this greater cooperation became immediately evident. The reduction in cost from \$34.50 to \$10.00 per year to each subscriber is one of them. The greatly increased number of American ophthalmologists who receive this better journalistic service is equally capable of statistical demonstration. The correspondingly larger circle of readers that each writer can count upon is an obvious gain; and advertisers who watch closely the results of their expenditures will be able to express their returns in cold figures.

But there are phases of this cooperation which secure benefits less immediately evident, yet in the end more lasting and important. In place of a lay publisher, or one or a few editors, supporting and controlling an ophthalmic journal, forty-four ophthalmologists have joined together to support this enterprise. It is thus assured that the journal will remain under the control of professional ideals and responsive to the wishes and general interests of the profession. Concentration of executive responsibility may be necessary. But the executive of a democracy, even when given vast power, remains responsive to the wishes of his constituents to an extent never seen in an autocratic or individual control. We can expect from the members of the Ophthalmic Publishing Company intelligent supervision, and loyalty to general professional interests, as well as reasonable emphasis on business efficiency that gives results.

A notable gain to the literature of ophthalmology should come from closer cooperation between writers and editors. Certainly the work of the editor could be lightened and turned in more important directions, if each writer would make himself familiar with the form adopted for the presentation of original papers in this one journal, and would prepare his manuscript in conformity with it. But in this journal a great gain will be the bringing to every writer a command of all the literature of ophthalmology bearing upon his subject. It will be a long time before even our present ideals regarding this matter can be fully realized. But we can safely promise that from the start, every one of our readers will have the advantages heretofore afforded by the Ophthalmic Year Book that have so impressed some of our contributors. The organization of the Ophthalmic Literature and Year Book contributors, extended and made more effective, is now a part of the editorial organization of the American Journal of Ophthalmology, and wider cooperation on the part of the profession must make its work more generally valuable.

The cooperation of writers, editors, and publishers for the benefit of readers is commonly and rightly assumed to be the primary object of journal organization. It is hoped that it will not be lost sight of at any time in the case of our journal. But it is a purpose that may be carried farther than has heretofore been done, and in new directions. We shall come back to discuss it at other times, but two points may be mentioned here.

In the selection of material for our pages it will be our endeavor to hold the interest of our readers; and to make and keep that interest broad. This will necessitate the introduction of papers that some professor of ophthalmology would call elementary, or some laboratory worker would dub unscientific. We shall devote space and illustrations to other papers that the practical worker may regard as theoretical or ultrascientific. Both sets of critics need to broaden their interests, before they can be ranked as all-around ophthalmologists.

The true interest of readers also demands the widest authorship of the papers published in the journal. Not only should the review department reflect all that is of importance in the ophthalmic literature of the world, but the original papers should express the experience and ideas of as large a number of contributors as possible. Every ophthalmologist who has taken his work seriously and gone through several years of active practice, has encountered cases that should be recorded; has had impressions and ideas that would be of value to many other workers in this field. The ideal condition would only be reached when every worker in ophthalmology contributed something to its literature. By readiness to accept the contributions of new writers, and to assist them to put their thought into brief, clear, language and strip it of what tends to obscure rather than explain it, the editorial staff may render its most valuable assistance to journal readers.

To the Ophthalmologists of America this American Journal of Ophthalmology comes not as an achievement,



but as a beginning—an opportunity. It is an opportunity for wider, closer, more serviceable cooperation. The benefits it will bring are still indefinite and lie in the future. But they are none the less real, and they will come to us as fast as we come to understand their value, and the conditions under which they can be secured.

E. J.

### ADVERTISING.

The advertising pages of the modern magazine or newspaper have been the place where individual whim and exploitation could develop, unchecked by any consideration of cooperative benefit. But in this journal, just as certainly as in the reading pages, cooperation for mutual benefit will dominate the policy with regard to advertising. This benefit will not be mutual merely for advertisers and publishers. The subscribers, as having by far the largest interest and having first made the journal possible, will receive the largest consideration.

These aims will be borne steadily in mind. The things advertised will be things in which ophthalmologists are especially interested. Only strictly ethical advertisements will be admitted. Only such drugs will be advertised as conform to the requirements of the Council on Pharmacy and Chemistry of the American Medical Association. Along all lines only responsible firms and institutions, that can be relied on to make good their promises, will be admitted to these pages.

To understand what we mean, take the column headed "PRESCRIPTION OPTICIANS." Every ophthalmologist in active practice sometimes wishes to inform a patient where he can get his glasses properly ground and fitted, or repaired, in some distant city. The cards of those who are known to be competent and reliable will furnish a directory useful to many of our readers.

To secure such a directory we have not asked every optician who would like it to take all the space he was willing to pay for. But a rigid form and limit of space have been adopted, that

will make the directory easy to consult. Letters have been written to three ophthalmologists of wide reputation in each of these cities, asking them to designate the opticians they can best recommend. As their replies come in, the optician who seems to have the most general respect and confidence of the profession is given the opportunity to place his card in this column.

During the first few months our pages will carry some advertisements taken over with the journals merged. But as time goes on our policy of classified advertising, of the highest interest and value to our readers, will be more completely worked out.

E. J.

### RECURRING AND MASSIVE HEMORRHAGES IN THE VITREOUS

The paper on this subject printed elsewhere in this issue, brings up the clinical and practical aspects of a very important condition. While fortunately not very common, it has the importance that attaches to every pathologic condition that may end in blindness; and it is quite liable to be bilateral.

In view of this danger of blindness, that vitreous hemorrhage carries with it, the practical means of promoting absorption, and preventing blindness in the individual case, cannot fail to be of interest. But it may be doubted whether great progress will be made in this direction without a better understanding of the etiology of such hemorrhage, than has been at our command in the past. Most eyes that become permanently blind from this cause recover from one or more attacks, and only succumb to repeated hemorrhages and gradual reduction of recuperative power. If the later recurrences could be prevented by removing the underlying cause, the patient might in the end have useful or even unimpaired vision.

The paper referred to goes somewhat into the subject of etiology, but does not go into it exhaustively. Especially it does not indicate the amount or im-

portance of the recent literature connecting such hemorrhages with tuberculosis. In pulmonary tuberculosis hemorrhage is so important a symptom, that occurring within the eye without trauma or other obvious cause, it might well suggest a tuberculous origin. The stumbling block in such a path of investigation is the usual absence of marked signs of pulmonary involvement in such cases, causing the medical adviser to reject or not to think of tuberculosis as a possible cause.

But in the last two or three years a good many cases have been reported in which, without symptoms of phthisis, the evidence of tuberculosis in the patient has been pretty clearly worked out. Focal reactions of diminished vision, increased haziness and hyperemia, and even recurrences of hemorrhage after injection of tuberculin, have seemed to demonstrate the connection of the local process with tuberculosis. We are not justified in the assumption that all such intraocular hemorrhages are of tuberculous origin. Yet the character of the hemorrhage, the general conformity of the case to a certain type, pointing toward a specific cause, well set forth by Eales thirty-six years ago, and the satisfactory recovery of recently reported cases under tuberculin treatment, all indicate that many of these cases may be of this character.

At least the reported evidence is sufficient to justify a very careful investigation of this point in every case that is to be reported. It will also be especially helpful to have reports of cases which can be clearly traced to other causes, or in which tuberculosis is excluded by careful investigation. No one observer sees enough of these cases to pronounce a final judgment on their etiology. But if we build up a sound literature of such case reports, any student of it can draw therefrom valuable conclusions.

## RECORDS OF VISUAL ACUITY.

It generally happens that those who are thoroughly accustomed to one way of doing a thing fail to notice the

marked disadvantages of their method, and are slow to adopt something better. Some one unaccustomed to it can better point out how it might be improved. This applies to the usual method of designating visual acuity. Among the communications that have reached the *Journal* is one from the Deputy Commissioner of the New York Department of Labor, who writes:

"Claimants come before me with different degrees of loss of vision and I have to determine how much compensation they are entitled to. If they have lost 100 per cent of vision they are entitled to 128 weeks at two-thirds of their pay as compensation, and if they lose 50 per cent they are entitled to half of that, depending upon the percentage of loss of vision as the basis that I make my awards on for loss of vision.

Frequently I get reports from oculists whose distance of range is not always 20 feet. I understand that if percentage comes in as 20/20 that the man has 100 per cent of vision, perfect vision; 20/30, he has  $66\frac{2}{3}$  per cent of his vision, and has lost  $33\frac{1}{3}$  per cent; 20/40, he has 50 per cent of vision and has lost 50 per cent, and so on down to 20/200, which would give him 90 per cent loss of vision.

I understand this scale when it comes in to me on the 20 feet distance, but frequently oculists use a different range than 20 feet, and it is very confusing for me to decide what to agree to as loss of vision. I am writing this to you to request that you publish it in your paper so that the oculists may read it. My request is, that in filling out the reports that an oculist always state specifically the *percentage* of loss of vision that the patient has.

Thanking you in advance for extending this courtesy to me, I am,

Very truly yours,

W. A. ABBOTT,

Deputy Commissioner."

When Snellen proposed to record visual acuity by a fraction, he suggested that the denominator should al-

ways be in Roman numerals and the numerator in Arabic, thus  $\frac{20}{xx}$ , indicating that the vision had been taken at 20 feet. Other ranges have been adopted, and the usual range is often designated as 6 meters. Even when 20 feet is adhered to the Roman numerals are given up. The percentage basis has gradually come into almost uni-

versal use in statistical studies. Applied to records of visual acuity it is easier to read, easier to print, superior in all ways, except that we are not accustomed to the method. If the change made necessary the renumbering of our test-cards it would be an advantage, for they would be numbered more accurately.

E. J.

## BOOK NOTICES.

**Foster, M. L., DIAGNOSIS FROM OCULAR SYMPTOMS.** 8vo, pp. 490.

Cloth Price \$6.00. New York; Rebman and Company, 1917.

The correlation of ocular symptoms in this very readable book fills a place in ophthalmic literature, as the subject is treated very much as when the clinical diagnostician makes his examination. The patient states the symptoms or they are elucidated by the questions of the examiner and from the objective examination.

This is a book of symptoms. There is very little given as to history course, anatomy, pathology, sequelae, prognosis or treatment, and very little under differential diagnosis. It is not a text-book on disease, but it is a well-written symptomatology, and thus of value to the beginner, as the latter, together with the general practitioner, needs the other general guides for ophthalmic diagnosis. Hence the author may perhaps be excused for certain omissions such as fuller notes upon focal infection, or the question of the differential diagnosis between aural and ocular vertigo.

On page 304, there is a misstatement, for the X-ray will detect fragments of certain kinds of glass. See Sweet's article in "Ophthalmology," July, 1906, p. 592; also illustrated in the Reviewer's book, "Injuries of the Eye," p. 256.

The book is beautifully printed in large type and on a kind and color of paper that is optically the best. The index is quite complete. The author is

to be thanked for this interesting and valuable contribution to ophthalmic literature.

H. V. W.

**Fuchs, E., TEXT-BOOK OF OPHTHALMOLOGY.** Authorized translation from the Twelfth German Edition, with additions supplied by the author, and otherwise enlarged, by Alexander Duane. Fifth Edition, 1067 pages, with 462 illustrations. Philadelphia and London: J. B. Lippincott Company. Cloth. Price \$7.00.

When we had the pleasure of reviewing the twelfth edition we emphasized the extraordinarily high number of editions of this famous book, that became necessary within the twenty years since its first appearance. It again brilliantly displayed the unceasing efforts of the author to secure for his work its preeminent place among the best books on ophthalmology. An entirely novel feature was the addition of a whole new part constituting a splendid introduction of 62 pages on the general physiology, pathology, and therapy of the eye. Since that time no new German edition has been issued and none is at present contemplated.

We therefore heartily hail the new American edition by Dr. Duane, which in several senses is a new work. For, as the translator states, Prof. Fuchs not only gave his permission for the insertion of very valuable additions by the translator, but also himself supplied notes of many additions and changes. Some radical changes in the arrangement of the text by the translator, with the approval of the author, will make



the book more serviceable as a work of reference: "The many pages of remarks, in fine print, which were massed as an appendix at the end of chapters of major divisions, and whose considerable value and interest was somewhat obscured by this arrangement, were split into shorter sections, each placed in direct juxtaposition to the portion of the text with which it was related. Some of the more important items in the fine print were transferred bodily to the text, also the descriptions of various operative methods previously scattered through other portions of the book to part V, on operations."

The section on the diagnosis of ocular paralyses has been entirely rewritten and numerous and important changes, necessitated by the progress of ophthalmology, have been made by the translator in all parts of the book. These are indicated by brackets and the initial D. Most important are the additions in the chapters on glaucoma, diseases of the retina, refraction, accommodation, and operations, and scattered through all parts of the book. To mention only a few, there are remarks on tuberculin and vaccine therapy, visual field and color tests, mapping of scotomata and the blind spot, extragenital gonococcus infection, inclusion blennorrhea, etiology of trachoma, etiology of iritis, sclerosis of the choroid. Elliot's summary of glaucoma theories, retinitis exudativa, angiomatosis retinae, and the newer operations, etc.

These changes, so largely made on his own responsibility, certainly will not serve to detract, as the translator modestly says, from the many excellencies of the book which, for 27 years, has remained a model of its kind. But they greatly enhance its value by imparting to it an unusual completeness, which deserves the highest praise and recommendation. The innovation of numbered paragraphs and the excellently arranged index greatly facilitate orientation.

The number of illustrations has been increased from 392 to 462. The external appearance, print and paper are excellent.

C. Z.

**ANNUAL REPORT OF THE SURGEON GENERAL OF THE PUBLIC HEALTH SERVICE OF THE UNITED STATES.** For the Fiscal Year 1916. 421 pages, including Index. Washington Government Printing Office, 1916.

The ophthalmologist, as a rule, either does not have opportunity or occasion to delve in Government reports. Some of them, such as Public Health Service Reports, contain information of value to the practitioner. That of this year, on pages 33 to 38, gives a report of the trachoma work in the Appalachian mountains; shows that the establishment of small hospitals in known infected districts has proven the best method of eradication and prevention of trachoma. There are three trachoma hospitals in Kentucky, the Jackson, Hindman and the London Hospitals; two in West Virginia, the Welsh and Coeburn Hospitals, and one in Claiborne County, Tennessee; 328 public health talks have been given, 3,571 homes visited, 624 schools and 26,975 pupils examined. Of a grand total of 51,957 people examined, 3,666 were found to be suffering from trachoma. Twelve field clinics have been given, 122 operations done, 145 local physicians present at the clinics and instructed in the diagnosis and treatment of trachoma.

There is no doubt that trachoma has been increasing in the Appalachian mountains. The establishment of these little hospitals will no doubt prevent its further spread and reach it, especially among the children, where it is usually incipient and readily curable.

H. V. W.

**Braum, Alfred, and Friesner, Isidore, THE LABYRINTH.** With fifty figures in the text and thirty-four half tones on twenty-four plates. New York. Rebman Company, 141-145 West 35th St. Price \$4.50.

The past few years has been most marked in the development of the relations of the structure contained in the temporal bone, i. e.: the hearing and the equilibrium apparatus to the

general organism, and with this is associated that afforded by a sense of sight and the eye muscles. No longer can the ear be clinically looked at as it was thirty or more years ago as purely a sense organ of hearing, whose diseases were practically limited to wax and pus in the ears, middle and internal ear deafness.

Really my last few years of study of the temporal bone organs has astounded me with their utmost complexity, especially in their relations to the cerebellum and cerebrum. Indeed these sense and equilibrium organs are so far more complex than is the eye and they are so related to the eye that it is well for the pure ophthalmologist to be informed concerning them.

While this book of Braun and Friesner is well up to the date of publication, yet since that time many more clinical facts have been evolved and the

subject has been so exhaustively studied that we may look for further and more complex works upon the subject of the Labyrinth and its brain connections and even for the establishment of a separate specialty which may go under the name of "Oto-Neurology." Thus this well-written and understandable book is but a stepping stone in the progress of this new specialty. More particularly the large amount of work now being done by the Head Surgeons of America in the examinations of candidates for aviation in Army and Navy service makes this book a necessary guide for the explanation of the physiologic conditions we thereby encounter. In addition to this the work goes on to the pathology of the Labyrinth and the surgical operations rendered necessary for relief.

It is beautifully printed and well illustrated by plates drawn by the authors.  
H. V. W.

## NEWS ITEMS.

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado.

As these columns go to press on the 30th of the month, contributors should send in their items before that date.

The following gentlemen have consented to supply the News Items Editor with the news from their respective sections: James A. Black, San Francisco; Marcus Feingold, New Orleans; Wm. F. Hardy, St. Louis; Geo. H. Kress, Los Angeles; W. Holbrook Lowell, Boston; Henry R. Skeel, New York City; Chas. P. Small, Chicago; Geo. M. Waldeck, Detroit; Oscar Wilkinson, Washington, D. C. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered, as well as all foreign countries. Volunteers are therefore needed, and it is hoped that they will respond promptly to this call.

Dr. Frank Loring Sargeant died recently at his home in Victoria, Texas.

Dr. James Mills of Janesville, Wisconsin, recently jumped from a bridge and was drowned.

Dr. Wm. S. Yager, Nebraska City, has been appointed physician for the School of the Blind, to succeed Dr. Claude Watson, deceased.

Dr. John Green, Jr., has been appointed a member of the Trachoma Commission of the Southern Medical Association.

Drs. Roland McKenzie and Edwin B. Goodall, of the staff of the Massachusetts Charitable Eye and Ear Infirmary, have gone to Halifax to assist in the relief work.

A committee for relief work among those blinded in the recent disaster in Halifax has commenced work, more than 210 persons having been blinded through the explosion.

Dr. E. V. L. Brown, who has succeeded Dr. Casey Wood as head of the Ophthalmological Department in the University of Illinois, has made some radical changes in method of clinical instruction in the school.

The Faculty of Medicine, Buenos Aires, has named Dr. Enrique B. Demaria to succeed Prof. Lagleyze to the chair of clinical ophthalmology.

The Société Française d'Ophtalmologie will hold a meeting May, 1918. Dr. Terrien

will give a report on X-rays and Radium in Ophthalmology.

A new organization is proposed, to be formed of ex-interns of the Illinois Charitable Eye and Ear Infirmary, Chicago, and graduate interns of other recognized hospitals for the care of diseases of the eye, ear, nose and throat. For particulars regarding this new organization, ex-interns are requested to address Dr. Ralph H. Woods, La Salle, Ill.

Teaching fellowships are available in Medicine, Surgery, Nervous and Mental Diseases, and Ophthalmology and Oto-laryngology at the University of Minnesota. These fellowships cover courses of three years' training for specialists and carry with them stipends of \$500, \$750, and \$1,000 in the three years successively.

There are about 2,000 practicing optometrists in Pennsylvania and 800 in Philadelphia. The State Board recently began examining the optometrists in Philadelphia. The examinations, which cover five subjects, are the first to be held under the new law to license men engaged in the practice of optometry, and are designed to eliminate the charlatan. The results of this examination showed that a number of applicants could neither read nor write English.

The Clinical Course and the Diagnosis of Trachoma is the title of an article in the American Medical Association Journal of December 1st, by M. H. Foster, Surgeon, U. S. Public Health Service, Boston. He divides the disease into two classes, "fulminating" and "slow." His ideas on the diagnosis and management of the disease are new. His illustrations are unusually fine and instructive. The author is to be congratulated upon giving us such a splendid paper on this very stubborn subject.

A new Calcutta Eye Hospital has been proposed. Its chief surgeon will be F. P. Maynard, F. R. C. S., Lieut.-Col. I. M. S., Professor of Ophthalmic Surgery, Medical College, Calcutta. The hospital will start with 162 beds. The building will be four stories in height and modern in construction in every particular. The site acquired for it faces on Halliday street, a new thoroughfare being driven through the crowded part of the town from north to south. It is next to the Tropical Medicine School and Hospital.

Ophthalmologists throughout the country are urged to write their senators and congressmen to support the bill to be introduced in the coming session of Congress, which provides that the Medical Officers of the Army shall have the same rank as prevails in the Medical Corps of the Navy; that out of 10,000 medical officers in active service there shall be twenty-five major-generals, twenty-five brigadier-generals, four hundred colonels, eight hundred lieutenant-colonels, two thousand three hun-

dred and fifty majors, thirty-two hundred captains, and thirty-two hundred first lieutenants; that medical officers shall be equal in rank and authority with officers of the line, and that these provisions shall apply both to the regular service and the Medical Reserve Corps.

## WAR NOTES.

Major G. I. Hogue of Milwaukee, Medical Corps, U. S. N. G., is stationed at Camp MacArthur, Waco, Texas.

Lieut. C. A. Bahn of the Tulane University is the acting adjutant of the Base Hospital Unit at Fort Oglethorpe, Georgia.

Maj. Nelson M. Black, of the Wisconsin Committee on Prevention of Blindness, is serving on the Sub-Committee on Ophthalmology of the General Medical Board of the Council of National Defense.

Capt. William C. Finnoff of Denver, Colo., is one of the medical personnel of the Base Hospital, No. 29, which has been formally accepted by the War Department.

Lieut. James M. Shields, formerly of Colorado, has been stationed at the Base Hospital at Fort McHenry, Maryland, where he is in charge of the Eye, Ear, Nose and Throat ward.

The Johns Hopkins Hospital and the South Baltimore Eye, Ear and Throat Hospital have offered to take some of the men stationed at Fort McHenry and give them special training. The Hopkins has taken six men and the South Baltimore has asked for four.

Lieut. M. H. Post, Jr., of St. Louis, stationed at Fort Oglethorpe, Ga., suffered an attack of lobar pneumonia recently. The crisis was successfully passed, and we are pleased to note that Lieut. Post is at present recuperating in Florida.

Major George E. de Schweinitz of Philadelphia is on active military duty in France.

Major P. H. J. Farrell, who is stationed at Camp Travis, Texas, was at home on a short furlough recently, and while there read a paper before the Chicago Medical Society on "The Medical Officer with the National Army."

Boston's report on her ophthalmologists who are on war duty is as follows:

Capt. W. N. Souter is stationed at Fort Constitution, in New Hampshire.

Major Alexander Quackenboss, M. R. C., received his commission some time ago, but has not yet been assigned to duty.

Major Walter B. Lancaster is on active duty at Camp Devens, Ayer, Massachusetts.



Dr. L. W. Jessaman has been serving for some months with the Harvard Surgical Unit, in France.

Captain George S. Derby is serving in France with the Peter Bent Brigham Unit.

Lieut. Ralph Hatch is serving in France with the Massachusetts General Hospital Unit.

Dr. Robert G. Loring has gone to Halifax to assist in the relief work there.

The Massachusetts Charitable Eye and Ear Infirmary has for some months given up two of its rooms, for the use of the Government in testing men for the Aviation Corps.

The St. Louis Ophthalmic Conference, with a total membership of twelve, is proportionately well represented in the service with five members commissioned.

Capt. L. T. Post has been for some time in active service in France; Lieut. M. H. Post is at Fort Oglethorpe; Major Wm. H. Luedde is on active duty recruiting in Missouri; Capt. F. E. Woodruff is on duty at the Mt. Clemens, Mich., Aviation Camp; Capt. E. C. Spitze has been commissioned but as yet not assigned to duty.

Chicago ophthalmologists are well represented among those serving the Government. On active duty at the present time may be mentioned: Major Casey A. Wood, who, in addition to his work of superintending the ophthalmologic department at the base hospital in Camp Sherman, Chillicothe, Ohio, is conducting a class in French for the benefit of the soldiers who will soon go to France. Major William H. Wilder is at Camp Taylor, Louisville, Ky.; Capt. George F. Suiker, at Camp Custer, Battle Creek, Mich.; Major Thomas Woodruff, who has been at Camp Grant, has recently been transferred to Fort Grebel, R. I.; Capt. Harry Gradle is at Camp Grant, Rockford, Ill.; Capt. E. K. Findlay, at Fort Snelling, Minn.; Capt. Geo. W. Woodwick, at Chicago.

The Chicago unit for the physical examination of candidates for the aviation section of the Officer's Signal Corps, U. S. A., is proud of the distinction it enjoys as the star unit of the country. From the time of the organization of the unit in the middle of last June up to the present time, over 3,300 applicants have been examined, not including many reexaminations. This is an average of over 110 a week. The unit is in charge of Capt. Francis Lane. Capt. Lane and Lieut. Charles P. Small conduct the ophthalmologic examinations and Lieut. A. A. Hayden has charge of the ear examinations.

The American Board for Ophthalmic Examinations has felt the effect of war condi-

tions most seriously. Dr. Alexander Duane retired from the Board because of his duty in the Naval service. Of the present members, Major William H. Wilder is at Camp Taylor; Major Frank C. Todd, Camp Dodge; Major Walter B. Lancaster, Camp Devens; Major Edward C. Ellett, Camp Meade. In spite of this handicap and the delays entailed, the work will still be carried on.

Arnold Lawson, F. R. C. S., Eng., of the Departmental Committee on the Welfare of the Blind, writes: "An immense amount of careful, patient, and thorough work is revealed in this report, which is a most complete and thorough exposition of a complicated national problem. A cursory glance through its seventy odd pages shows this much, whilst it may be stated that there is not a paragraph which will not repay careful reading and thoughtful consideration. The various issues raised in the discussion of this large subject have each of them received ample attention by the division of the Report into twelve sections or heads followed by general summary and conclusion."

**Reeducation of the Blind.**—"From an administrative point of view as well as for the systematic collection of funds, it is highly important to centralize war relief appeals and executive methods of distribution under one national organization. The Government has demanded that all relief organizations be coordinated under the Red Cross control. Following this general plan of absorption and centralization, a new school for the superior reeducation of the blind was turned over to the board of directors by M. Eugène Brieux of the Académie Française and President of the French section of the fund. This school has been formally opened at 27 boulevard Victor Hugo, Neuilly, in a spacious building with extensive gardens, which was formerly a seminary for young ladies. The premises have been leased and thoroughly equipped for a school for the blind by Mrs. Kessler, and given over in the name of the Permanent Blind War Relief Fund to the French section. This fund has already guaranteed a pension of 1,200 francs a year for life to every soldier both blinded and seriously maimed, in addition to purchasing cottages for many of them. It has opened extensive workshops and supplied, at cost price, on credit, to every reeducated blind man. It has a knitting school. It sends every blinded man who has no private means, after his reeducation in no matter which school, to his country town, paying his rent for one year and furnishing him with the means to reestablish himself and earn his own living."—(Extract from Paris Letter in Medical Record of December 1, 1917.)

# OPHTHALMIC LITERATURE.

Under this head continuing the "Index of Ophthalmology" heretofore published in **Ophthalmic Literature** will be found the subjects of all published papers received during the last month, that bear to an important extent upon ophthalmology. The subject is indicated rather than the exact title given by the author. Where the original title has been in a foreign language it is translated into English. The journal in which the paper is published will indicate the language of the original.

The names of the different journals are indicated by abbreviations which generally correspond to those used by the **Index Medicus**, the **Journal of the American Medical Association**, and the **British Journal of Ophthalmology**. We will from time to time publish the list of ophthalmic journals, with the abbreviations used for each. Often a single letter discriminates between journals published in different languages. Thus "Arch. of Ophth." refers to the Archives of Ophthalmology, published in English; "Arch. d'Ophth." indicates the French Archives d'Ophthalmologie; "Arch. de Oftal." refers to the Archivos de Oftalmologia Hispano-Americanos, while "Arch. di Ottal." indicates the Italian Archivio di Ottalmologia.

In this index of the literature the different subjects are grouped under appropriate heads; so that all papers bearing on the same, or closely related subjects, will be found in one group. The succession of the groups is the same from month to month, and identical with that of the Digest of the Literature. Where a paper clearly refers to two subjects that belong in different groups, it will be noticed in both groups.

Each reference begins with the name of the author in heavyface type. This is followed by the subject of his paper. Then in brackets a number with (ill.) indicates the number of illustrations, or a number with (pl.) the number of plates illustrating the article, (col. pl.) indicates colored plates. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that the paper was read before some society and gave rise to a discussion which is published with it.

It is desired to notice every paper as soon as possible after it is published. Readers will confer a favor by sending titles they notice have been omitted, with journal and page of publication; and of their own papers, sending either a copy of the journal in which each appeared, or a reprint. These should be sent as soon as possible to 318 Majestic Building, Denver, Colorado.

## METHODS OF DIAGNOSIS.

**Beaumont, W. M.** Spiral Fields of Vision and Neurasthenia. Abst. in Lancet, Oct. 20, p. 624.

**Hurst, A. F.** Spiral Fields of Vision in Hysteria. (2 ill.) Lancet, Nov. 17, p. 768.

**Roelofs, C. O.** Tests for Visual Acuity. Nedrl. Tijdschr. v. Geneesk. 1917, p. 836.

**Walker, C. B.** Neurologic Perimetry. Ophth. Rec. v. 26, p. 600.

## THERAPEUTICS.

**Novarsenobenzol** by Intrarectal Route. Amer. Jour. Ophth. v. 34, p. 345.

**Djakow.** Treatment of Ocular Affections with Mineral Baths. Arch. d'Ophth. v. 35, p. 703.

**Jocqs.** Ocular Therapeutics. Clin. Opht. v. 22, p. 323.

**Terson, A.** Mercury Salicylarsinate in Ocular Disease. Paris Méd. v. 7, p. 282.

**Wolffberg.** Candiolin in Ocular Scrofula. Woch. f. Therap. u. Hyg. d. Auges, April, 1917. Clin. Opht. v. 22, p. 363.

## OPERATIONS.

**Bordley, J. Jr.** Ophthalmic Surgery in War. Clin. Cong. Surg. N. Amer., 1917. Abst. Surg. Gynec. and Obstet. Dec. p. 727.

**Crossley, E. R.** Device to Immobilize Head and Eyelids in Operations on Eyeball. (2 ill.) Jour. Amer. Med. Assn., v. 69, p. 2103.

## REFRACTION.

**Banos y Brena, F.** Mechanical Optics. (4 ill.) Arch. de Oft. Hisp.-Amer., v. 17, p. 556.

**Bourgeois, A.** Notation of Astigmatism. Arch. d'Ophth., v. 35, p. 641. Ophth. Lit., v. 7, p. 132.

**Joynt, J. W.** Functional Spasm of Accommodation. Brit. Jour. Ophth., v. 1, p. 780.

**Landolt, E.** Interpretation of Skiascopy. Arch. de Oft. Hisp.-Amer., v. 17, p. 645.

**Merriam, L. A.** Eye Strain. West. Med. Rev., v. 22, p. 559.

**Post, M. H.** Change of Refraction After Diabetes. Amer. Jour. Ophth., v. 34, p. 329.

**Terrien, F.** Astigmatism and Contusion of Globe. Arch. d'Ophth., v. 35, p. 689.

## OCULAR MOVEMENTS.

**Marin, M.** Facial and Oculomotor Paralysis from Lead Poisoning. (Bibl.) Arch. de Oftal., Hisp.-Amer., v. 17, p. 635.

**Neeper, E. R.** Divergent Squint. Colo. Ophth. Soc., Oct. 13, 1917. Ophth. Rec., v. 26, p. 637.



Von der Heydt, R. Management of Squint.  
Ill. Med. Jour., v. 32, p. 404.

### CONJUNCTIVA.

- Foster, M. H. Clinical Course and Diagnosis of Trachoma. Jour. Amer. Med. Assn., v. 69, p. 1837.
- Heckel, E. B. Monocular Gonorrheal Ophthalmia., Penn. Med. Jour., v. 21, p. 120.
- Lundsgaard, K. K. Prophylaxis of Gonorrheal Ophthalmoblennorrhoea. Ugesk. for Laeger, v. 79, pp. 1496, 1690.
- Monami, C. Conjunctival Eosinophilia and Provoked Conjunctivitis. (Bibl., 1 col. pl.) Arch. di Ottal., v. 24, p. 199.
- Morgano, P. Social Conditions and Trachoma; a War Problem. Arch. di Ottal., v. 24, p. 237.
- Morrie, G. Prophylaxis of Blennorrhoea Neonatorum. Ugesk. for Laeger, v. 79, p. 1655.
- Ophthalmia Neonatorum. Brit. Jour. of Opth., v. 1, p. 756. Brit. Med. Jour., Nov. 17, p. 702.
- Rönne, H. Xerophthalmia. Ugesk. for Laeger, v. 79, p. 1488.
- Schevensteen, A. van. Hyalin Degeneration in Old Trachoma. (1 ill.) Ann. d'Ocul., v. 154, p. 618.
- Stevenson, W. D. Aborted Gonorrheal Ophthalmia in Adult. Opth. Rec., v. 26, p. 621.
- Symposium on Ophthalmia Neonatorum and Gonorrheal Conjunctivitis. Sec. on Opth., Coll. Phys., Phila., March, 1917. Opth. Rec., v. 26, p. 624.
- Trapezontzeva, E. Pseudomembranous Conjunctivitis. Wiestnik. Oftal., Feb., 1915. Ann. d'Ocul., v. 154, p. 625.
- Wolfe, O. R. Pink Eye (Catarrhal Conjunctivitis). Jour. Kansas Med. Soc., v. 17, p. 323.

### CORNEA AND SCLERA.

- Basterra and Santa Cruz. Corneal Anomaly (Bilateral Embryotoxon). (2 ill.) Arch. de Oftal., Hisp.-Amer., v. 17, p. 538.
- Leoz Ortin. Experimental Keratoplasty. (7 ill.) Arch. de Oft., Hisp.-Amer., v. 17, p. 615.
- Patterson, J. A. Interstitial Keratitis. Colo. Opth. Soc., Oct., 1917. Opth. Rec. v. 26, p. 634.
- Robinson, J. R. Broad Arcus Senilis and Posterior Synechia. Opth. Rec., v. 25, p. 635.
- Santos Fernandez, J. Opacities of Cornea. Arch. de Oft., Hisp.-Amer., v. 17, p. 611.
- Shahan, W. E. Corneal Thermotherapy. Amer. Jour. Opth., v. 34, p. 321.
- Stephenson, S. Pseudoneoplastic Form of Interstitial Keratitis. Brit. Jour. Opth., v. 1, p. 754.
- Urra, F. M. Aspergillus Keratomycesis. (1 ill.) Arch. de Oft., Hisp.-Amer., v. 17, p. 552.
- Wyler, J. S. Corneal Tattooing. Jour. Amer. Med. Assn., v. 69, p. 1902.

### ANTERIOR CHAMBER AND PUPIL.

- Roche, C. Inequality of Pupils from Lesions in Macula and Paramacular Region. Arch. d'Opht., v. 35, p. 680.

### UVEAL TRACT.

- Baumeister. Post-operative Cyclitis. Woch. f. Therap. u. Hyg. d. Auges, Jan., 1917. Clin. Opht., v. 22, p. 373.
- Darier, A. Treatment of Iritis with Serum Therapy. Clin. Opht., v. 22, p. 336. Treatment of Iritis and Keratitis with Parenteral Injections. Clin. Opht., v. 22, p. 341.
- Monbrun, A. Ossification of Choroid. (Bibl., 2 pl., 1 fig.) Arch. d'Opht., v. 35, p. 666.
- Schweinitz, G. E. de. Etiology of Iridocyclitis, with Special Reference to Focal Infections. Internat. Clin., Vol. 13, 27th Series, 1917.

### SYMPATHETIC DISEASE.

- Anaphylaxis in Sympathetic Ophthalmia. Editorial in Boston Med. and Surg. Jour., v. 177, p. 883.
- Dimmer, F. Sympathetic Ophthalmia and War. Klin. M. f. Augenh., Sept.-Oct., 1916. Clin. Opht., v. 22, p. 373.

### GLAUCOMA.

- Byers, W. G. M. Elliot's Operation. New York State Jour. Med., v. 17, p. 545.
- Curry, G. E. Megalocornea with Coloboma of Iris. Penn. Med. Jour., v. 21, p. 120.
- Filatow, V. P. Elliot's Operation. Wiestnik. Oftal., Feb., 1915. Ann. d'Ocul., v. 154, p. 625.
- Neepser, E. R. Subacute Glaucoma. Colo. Opth. Soc., Oct., 1917. Opth. Rec., v. 26, p. 631.
- Physostol in Treatment of Glaucoma. Woch. f. Therap. u. Hyg. d. Auges, Feb., 1917. Clin. Opht., v. 22, p. 363.

### CRYSTALLINE LENS.

- Barraquer and Anduyned. Suction Method of Extraction of Cataract. (6 ill.) Clin. Opht., v. 22, p. 328. Jour. Amer. Med. Assn., v. 69, p. 2006.
- Fisher, J. H. Cataract Extraction. Brit. Jour. Opth., v. 1, p. 749.
- MIady. Cataract from Atmospheric Pressure. Woch. f. Therap. u. Hyg. d. Auges, Feb., 1917. Clin. Opht., v. 22, p. 376.
- Moron Ruiz, J. Advantages and Inconveniences of Suture in Cataract Extraction. España Oftal., Sept., 1917, p. 138.
- Perez Bufil. Advantages of Iridectomy in Cataract Extraction. Arch. de Oft., Hisp.-Amer., v. 17, p. 541.
- Robinson, J. R. Diabetic Lenticular Opacities. Colo. Opth. Soc., Oct. 13, 1917. Opth. Rec., v. 26, p. 635.
- Schwenk, P. N. K. Operation for Congenital Cataract. Wills Hosp. Opth. Soc., Nov., 1917. Penn. Med. Jour., v. 21, p. 202.
- Tzytowski, M. L. Extraction of Cataract in Capsule. Wiestnik Oftal., Feb., 1915. Ann. d'Ocul., v. 154, p. 626.



**Vogt, A.** Embryonal Growth Center in Crystalline Lens. *Corresp.-Bl. f. Schweizer Aerzte*, Oct., p. 1342. *Jour. Amer. Med. Assn.*, v. 69, p. 1916.

**Wieden, J.** Extraction of Cataract (Barraquer's Operation). *España Oftal.*, Sept., 1917, p. 135.

**Zentmayer, W.** Symmetrical Lenticular Opacities in Cortex. *Penn. Med. Jour.*, v. 21, p. 203.

#### VITREOUS.

**Robinson, J. R.** Hemorrhage Into Vitreous. *Colo. Ophth. Soc.*, Oct., 1917. *Ophth. Rec.*, v. 26, p. 637.

#### RETINA.

**Bernstein, E. J.** Amaurotic Family Idiocy; Bilateral Blindness. *Med. Rec.*, v. 92, p. 1074.

**Kearney, J. A.** Importance of Eye-ground Examination in Infants After Difficult Labor. *Amer. Jour. Obstet.*, Dec., 1917, p. 904.

Night Blindness. Short Editorial, *British Med. Jour.*, Nov. 17, p. 664.

**Rand, C. W.** Amaurotic Family Idiocy. *Calif. State Jour. Med.*, v. 15, p. 503.

#### TOXIC AMBLYOPIAS.

**Yakovlewa, A. A.** Methyl Alcohol Amblyopia in Petrograd. *Wiestnik Oftal.*, June, 1915, p. 277. *Ann. d'Ocul.*, v. 154, p. 628.

#### OPTIC NERVE.

**Cantonnet, A.** Choked Disc After War Injury. *Paris Méd.*, v. 7, 1917.

**Eleonskaia, V. N.** Cystic Tumor in Region of Optic Nerve. *Wiestnik Oftal.*, Nov.-Dec., 1915, p. 489. *Ann. d'Ocul.*, v. 154, p. 630.

#### VISUAL TRACTS AND CENTERS.

**Billström, J.** Word Blindness. *Svenska Läkare. Handl.*, v. 43, p. 571.

#### COLOR VISION.

**Carter, R. R.** Appearance of Color Spectra to Aged. *Abst. in Lancet*, Dec. 8, p. 867.

#### EYEBALL.

**Allport, F.** Irrigation of Vitreous Chamber in Suppurative Panophthalmitis. *Ophth. Rec.*, v. 26, p. 620.

**Carpenter, E. R.** Enucleation of Eyeball and Sympathetic Ophthalmia. *Med. Press and Circ.*, v. 114, p. 392.

**Metz, R. B.** Spontaneous Explosion of Artificial Eye. (*Bibl.*) *Cleveland Med. Jour.*, v. 16, p. 719.

**Siredey, M. A., and Martin, L.** Double Ophthalmia and Cerebro-spinal Fever. *Lancet*, Nov. 17, p. 757.

**Struycken, H. J. L.** Preparation for Wearing Artificial Eye and Enucleation. *Nederl. Tijdschr. v. Geneesk.*, Sept., 1917, p. 779.

**Terrien, F.** Better Stumps for Artificial Eyes. *Paris Méd.*, v. 7, p. 277.

#### LACRIMAL APPARATUS.

**Garcia del Mazo, J.** Extirpation of Lacrimal Sac in Dacryocystitis. *Arch. de Oft.*, *Hisp.-Amer.*, v. 17, p. 562.

#### LIDS.

**Duverger.** Operation for Senile Ectropion. (3 ill.) *Arch. d'Opht.*, v. 35, p. 677.

**Markel, J. C.** Entropion Treated with Electrocautery. *Penn. Med. Jour.*, v. 21, p. 120.

**Menacho, M.** Associated Movements of Upper Lid with Mastication. (Marcus Gunn.) *Arch. de Oft.*, *Hisp.-Amer.*, v. 17, p. 640.

**Monte del A.** Etiology and Pathogenesis of Chalazion. (3 ill.) *Ann. d'Ocul.*, v. 154, p. 607.

**Posey, W. C.** Bilateral Coloboma of Lower Lids. *Penn. Med. Jour.*, v. 21, p. 203.

**Wible, E. E.** Herpes Zoster Ophthalmicus. *Penn. Med. Jour.*, v. 21, p. 120.

#### ORBIT.

**Cantonnet and Saint-Martin.** Gumma of Orbit. *Arch. d'Opht.*, v. 35, p. 692.

**Cousin, G.** Prothesis of Orbit. *Arch. d'Opht.*, v. 35, p. 694.

**Krivososoff, S.** Echinococcus of Orbit. *Wiestnik Oftal.*, Jan., 1915. *Ann. d'Ocul.*, v. 154, p. 624.

#### TUMORS.

**Arganaraz, R., and Belgeri, F.** Leucosarcoma of Orbit. (1 ill.) *Arch. de Oft. Hispano-Amer.*, v. 17, p. 602.

**Curry, G. E.** Melanotic Sarcoma of Orbit. *Penn. Med. Jour.*, v. 21, p. 121.

**Krebs, A.** Melanotic Sarcoma of Sclera.

**Zentmayer, W.** Malignant Growth in Antrum. *Wills Hosp. Ophth. Soc.*, Nov., 1917. *Penn. Med. Jour.*, v. 21, p. 202.

#### INJURIES.

**Allport, F.** Removal of Steel from Interior of Eye by Magnet. *Ill. Med. Jour.*, v. 32, p. 395.

**Brav, A.** Accidental Instillation of Corrosive Sublimate into Conjunctival Sac. *New York Med. Jour.*, v. 106, p. 1027.

**Duverger.** Two Months of Ophthalmology in Emergency War Hospitals. *Ann. d'Ocul.*, v. 154, p. 585.

**Eaton, E. M.** Determination of Position of Foreign Bodies in Relation to Eyeball and Component Structures. (23 ill.) *Brit. Jour. Ophth.*, v. 1, p. 721.

**Giuseppe.** Ocular War Injuries. *Ophth. Rec.*, v. 26, p. 623.

**Leplat, G.** Direct Shell Shot of Eye. *Arch. Méd. Belges*, v. 70, p. 385. *Brit. Jour. Ophth.*, v. 1, p. 763.

**Metz, R. B.** Spontaneous Explosion of Artificial Eye. (*Bibl.*) *Cleveland Med. Jour.*, v. 16, p. 719.

**Miller, G. V.** Injury to Eye Complicated by Brain Tumor. *Brit. Jour. Ophth.*, v. 1, p. 751.

- v. **Pflügk**. Radiography in Ocular Injuries. *Woch. f. Therap. u. Hyg. d. Auges*, March, 1917. *Clin. Opht.*, v. 22, p. 368.
- Pontius, P. J.** Scleral Injury. *Wills. Hosp. Ophth. Soc.*, Nov., 1917. *Penn. Med. Jour.*, v. 21, p. 203.
- Smith, J. R.** Laceration of Eyeball with Eyelash Driven into Lens. *Ophth. Rec.*, v. 26, p. 623.
- Terrien, F.** Astigmatism and Contusion of Globe. *Arch. d'Opht.*, v. 35, p. 689. *Ophthalmology* in 1917. *Paris Méd.*, v. 7, p. 275. *Jour. Amer. Med. Assn.*, v. 69, p. 1914.
- Teulières.** New German Gases and Effects on Eyes. *Jour. de Méd. de Bordeaux*, Nov., 1917. *Med. Rec.*, Dec. 27, p. 1077.

#### PATHOLOGY.

- Ocular Anaphylaxis. Editorial note, *New York Med. Jour.*, v. 106, p. 1187.

#### GENERAL DISEASES.

- Harkness, G. F.** Syphilis of Eye. *Jour. Iowa State Med. Soc.*, v. 7, p. 439.
- Lapersonne, F. de.** Vaccination Against Typhoid from Ophthalmologist's Standpoint. *Arch. de Méd. et de Pharm. Mil.*, v. 67, p. 236. *Jour. Amer. Med. Assn.*, v. 69, p. 2152.
- Otchapovski, S. V.** Ocular Syphilis in Province of Kouban. *Wiestnik Oftal.*, April, 1915, p. 157, 205. *Ann. d'Ocul.*, v. 154, p. 627.
- Poyales, F.** Bacteriologic Diagnosis of Ocular Tuberculosis. *Arch. de Oftal., Hisp.-Amer.*, v. 17, p. 629.
- Spitze, E. C.** Interrelation of Diseases of Eye, Nose and Throat. *Ill. Med. Jour.*, v. 32, p. 399.
- Traquair, H. M.** Venereal Disease and Blindness. *Brit. Med. Jour.*, Nov. 17, p. 706.
- Weekers, L., and Firket, J.** Ocular Manifestations in Hemorrhagic Spirochetosis. *Arch. d'Opht.*, v. 35, p. 647.

- Youdine.** Ocular Lesions in Plague. *Wiestnik Oftal.*, Jan., 1915. *Ann. d'Ocul.*, v. 154, p. 624.

#### COMPARATIVE OPHTHALMOLOGY.

- Ochoterna, L.** Retina of Mexican Axolotl. *La Escuela Medico-Milit.*, Mexico, v. 1, p. 2. *Jour. Amer. Med. Assn.*, v. 69, p. 157.

#### HYGIENE.

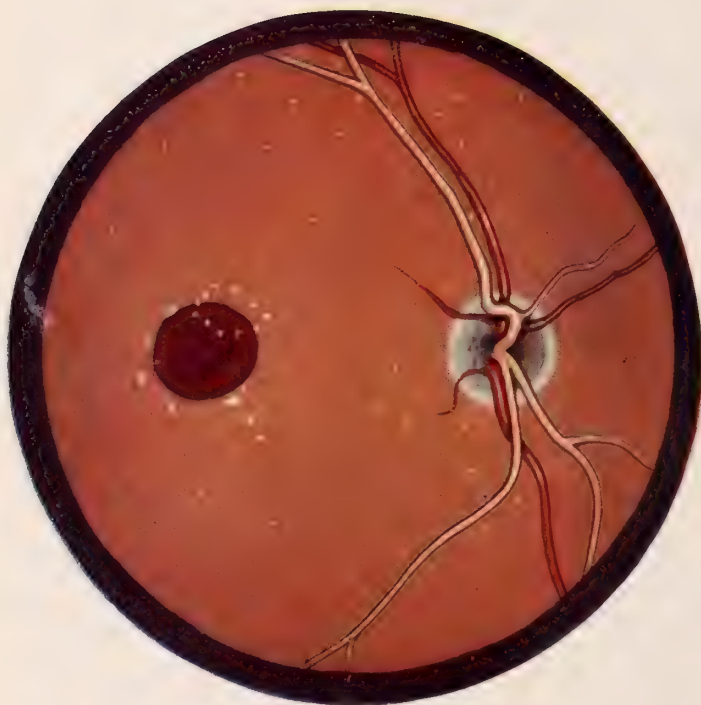
- Ferree, C. E.** Lighting in its Relation to Eye. *Science*, v. 46, p. 220.
- Monson, S. H.** Care of Eyes of School Children. *Ohio State Med. Jour.*, v. 13, p. 813.
- Thewlis, M. W.** Care of Eyes of Aged. *Med. Rev. of Rev.*, v. 23, p. 823.

#### OPHTHALMIC SOCIOLOGY AND HISTORY.

- Bourgeois, A.** History of Glasses in Tapestries of Cathedral at Rheims. *Ann. d'Ocul.*, v. 154, p. 631.
- Davis, E. M.** Value of Visual Instruction in Training Schools for Nurses. *Trained Nurse*, Dec., 1917, p. 338.
- Hansell, H. F.** Professor George Stanculeanu—A Tribute. *Ophth. Rec.*, v. 26, p. 646.
- Leavitt, M. J.** Ophthalmologist and General Practitioner. *New York Med. Jour.*, v. 106, p. 1078.
- Rovinsky, A.** State Examination and Treatment for Eye Disease in School Children. *New York Med. Jour.*, v. 106, p. 978.
- Sight Testing for the War. *Jour. Maine Med. Assn.*, v. 7, p. 322.
- Stanculeanu, G.** Address before San Francisco County Medical Society. *Ophth. Rec.*, v. 26, p. 617.
- Trachoma and the Army. *New York Med. Jour.*, Oct. 13, 1917.
- Weekers, L.** Organization of Ophthalmic Service in the Army. *Ann. d'Ocul.*, v. 154, p. 569.







HOLE IN MACULA IN NEGRO. BURKHOLDER'S CASE.

# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. I

FEBRUARY, 1918

No. 2

## HOLE AT THE MACULA.

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Report of case probably of traumatic origin occurring in a negro. Illustrated by colored drawing and one figure in the text, and with a bibliography.

Knapp<sup>1</sup> in 1869 and Noyes<sup>2</sup> in 1871 were the first to call attention to an anomaly of the fundus consisting of a circular punched-out hole in the macular region, but it was not until after the studies of Kuhnt and Haab in 1900 that case reports of this interesting condition became fairly numerous.

H. D. S., a negro, age 27 years, came into the service of Major Casey A. Wood at the Base Hospital, Camp Sherman, Ohio, complaining of poor vision in the right eye with a spot in the line of vision which had become quite troublesome. He admitted that the sight in the affected eye had always been poor, but he could not remember just when it began to fail. When a young boy he received a violent blow on the right eye with a corn cob and for several days following was almost totally blind in the injured eye. The patient thought, however, that the vision had not been good for some time previous to the accident. He gave a history of the usual diseases of childhood, but was otherwise healthy with the exception of an attack of "scrofula" at ten years of age. At 22 the patient was taken sick with what was diagnosed as syphilis. Although he denied a primary lesion, he gave a history of body rash, some sore throat with other symptoms which might be construed as secondary signs. The patient himself thinks that this attack

was of a tubercular nature, as he had a bad cough with profuse expectoration. He admits three attacks of gonorrhea. Although married four years he has no children. His wife has had two miscarriages and has been in poor health for the last two years. Both parents of the patient are living and have good eyesight.

Physical examination of the chest was negative.

Wassermann was negative.

Urine negative for albumin and sugar.

Blood examination showed 4,169,000 red and 8,600 white corpuscles. The differential count showed no variation from the normal.

Examination of the eyes showed:

Vision, O. D. 8-200

O. S. 20-15.

Refraction under a mydriatic gave 1 diopter of hypermetropia in each eye.

Right cornea negative.

Iris was not adherent to cornea or lens.

Vitreous was clear.

The lesion as shown in the accompanying illustration consists of a large circular excavation slightly larger than the disc, located in the macular region. The excavation is about one millimeter deep with precipitous and sharply marked pigmented margins. The floor of the excavation is of a deep red mottled appearance, with a few grey-

ish white spots showing through. Surrounding the hole and closely approaching the edge are the greyish white retinal margins which gradually extend into the normal retina. Numerous crystals of cholesterin are imbedded in the floor of the hole and the surrounding retina. No cholesterin crystals are discernible in the vitreous. The nerve head is apparently normal.

The visual fields show a slight contraction of form and colors with total

generation in the retinal layers with subsequent rupture and formation of a hole.

Coats thinks that this degeneration is due to an edema of the retina at the posterior pole involving usually all of the layers of the retina, but may produce a retinal hole from edema of the inner layers only.

Fuchs points out that the pathology may be the same whether due to traumatic or inflammatory changes. There

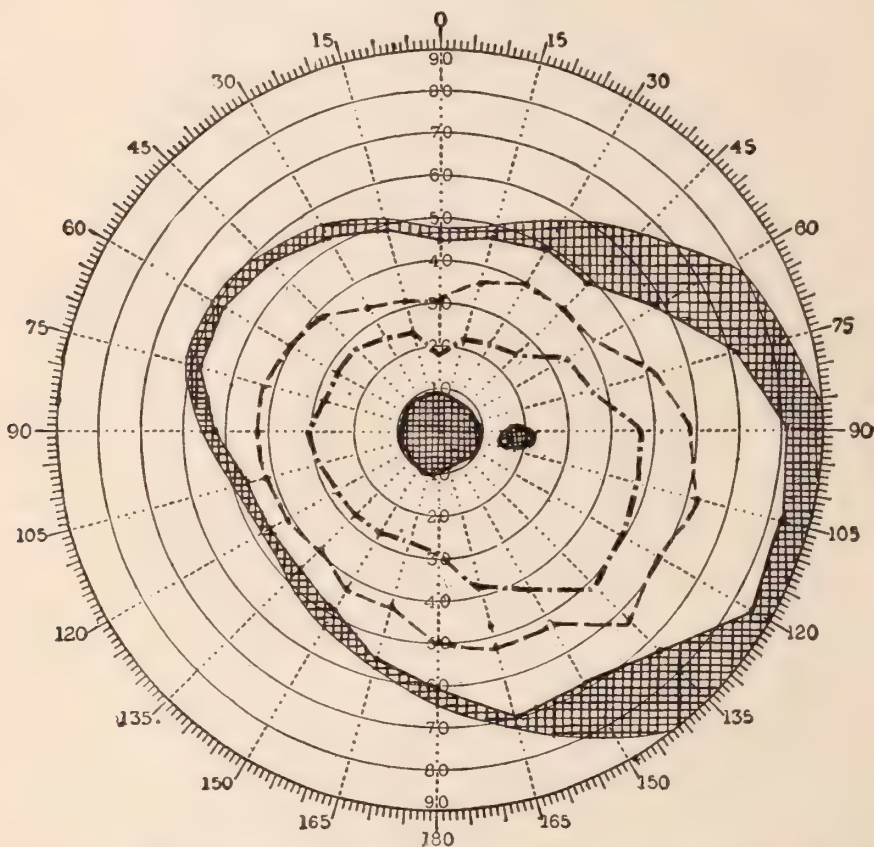


Fig. 2.—Field of vision, Burkholder's case of Hole at Macula. The outer broken line represents boundary of field for blue. Inner broken line field for red.

loss of green vision. There is a large central scotoma corresponding to the lesion in the macular region. The left fundus is normal to all appearances. There are no cholesterin crystals in the left fundus or vitreous.

The pathology of macular hole as studied by Fuchs,<sup>3</sup> Coats,<sup>4</sup> v. Hippel,<sup>5</sup> and others seems to point to a cystic de-

generation in the retinal layers with subsequent rupture and hole formation. He also considers that a contusion might result in serious molecular changes and death of the cells with absorption without edema or cystic formation.

Twietmeyer<sup>6</sup> reported two cases in 1909 which were caused by contusion



of the eye ball. The injury was followed by a punched-out hole with a red base in the macular region.

One of his cases is of importance because the observer saw the patient immediately following the injury, at which time the macular region was opaque and the veins tortuous and full. In about three weeks this condition changed to a typical hole at the macula.

R. Foster Moore<sup>7</sup> (1910) reported a case of concussion of the eye ball the ophthalmoscopic examination of which showed a hole in the macula  $1\frac{1}{3}$  the size of the optic nerve head. The opposite side showed a similar condition, but there was the appearance of bright red holes with shelving edges and

many whitish areas of all sizes scattered about this region.

A. C. Clapp<sup>8</sup> (1913) reported a case of macular hole following a contusion in which there were numerous deposits of cholesterol crystals in the vitreous as well as the fundus.

Zentmayer<sup>9</sup> in 1909 and de Schweinitz<sup>10</sup> in 1904 reported cases of macular hole of nontraumatic origin. The lesion has also been observed following postoperative iridocyclitis.

Whether or not the lesion as described in this case report was caused by an injury, or is the result of some inflammatory process, it is impossible to ascertain on account of the uncertain history furnished by the patient.

#### BIBLIOGRAPHY.

1. Knapp, H. *Archiv für Augenh. u. Ohrenheilk.* v. 1, p. 22, 1869.
2. Noyes, H. D. *Trans. Amer. Ophth. Soc.*, 1871, p. 128.
3. Fuchs, E. *Zeit. f. Augenh.* v. 6, 1901, p. 161. *Graefe's Arch. f. Ophth.* v. 79, 1911, p. 42.
4. Coats, G. *Royal London Ophth. Hosp. Reports*, v. 17, 1908, p. 69.
5. v. Hippel, E. *Graefe's Arch. f. Ophth.* v. 64, 1906, p. 172.
6. Twietmeyer. *Zeit. f. Augenh.* v. 18, p. 447.
7. Moore, R. F. *Trans. Ophth. Soc. United Kingdom*, v. 30, 1910, p. 155.
8. Clapp, A. C. *Ophth. Rec.* v. 22, 1913, p. 79.
9. Zentmayer, W. *Ann. of Ophth.* v. 18, 1909, p. 472.
10. de Schweinitz, G. E. *Trans. Amer. Ophth. Soc.* v. 10, 1904, 228.

#### GLAUCOMA FROM THE ABSORPTION OF SENILE CATARACT.

HAROLD GIFFORD, M. D., F. A. C. S.

OMAHA, NEB.

A paper discussing the relations between these two conditions and reporting four additional cases of such sequence, read before the Third Colorado Ophthalmological Congress, August 10th, 1917, with discussion.

The spontaneous cure of senile cataract is by no means so rare as is commonly supposed, or as would be inferred from the statement of Hess, in the last edition of the *Saemisch Hand-book*, that to date, over sixty cases of this sort have been reported. I have seen ten cases in which practically complete absorption of the cortex has occurred. In three of these, useful sight was obtained V=20/70, 20/100 and 20/200 respectively. In six others the conditions would have allowed useful vision if they had not been compli-

cated with glaucoma. This tendency for senile cataracts to undergo spontaneous absorption is so common that I think it may safely be said that while every one would develop a senile cataract if he lived long enough; so also would every one obtain a spontaneous cure, if life were sufficiently prolonged. Unfortunately, nature's method of cure does not give a good percentage of visual results. The frequency with which glaucoma is associated with the absorption of senile cataract has been noted by Mitvalsky<sup>1</sup> and Reuss<sup>2</sup>, and

more recently by Verrey<sup>3</sup>; but these writers have concluded that the glaucoma or some inflammatory complications are the cause of the absorption of the lens, while in my opinion the case is the other way around. I believe that the spontaneous absorption of the cortex of a senile cataract produces, in many cases, an increase of tension which may be temporary and unnoticed; or which may lead to complete blindness; in which case the absorption of the lens is commonly attributed to the influence of the glaucoma. In my previous paper<sup>4</sup>, in which I reported four cases of spontaneous cure of cataract, out of which three were complicated with glaucoma, I based my belief on the fact that in two of the cases the eye had been seen with a mature cataract without any signs of glaucoma some time before the absorption of the lens, and that after the absorption of the lens and the onset of the glaucoma, the other eye had been followed from two to seven years without the appearance of any signs of glaucoma.

Since that time I have seen four other cases of spontaneous cataract absorption associated with glaucoma; and from the continued observation of some of my previous cases I can give decidedly more positive proof of the dependence of the glaucoma on the absorption of the cataract.

In one of my previously reported cases, Case 1, a man of sixty-three had a preparatory iridectomy done on the left eye for an uncomplicated immature cataract. The patient returned after five years, with the left eye absolutely blind from glaucoma, with the lens all absorbed except a small brown nucleus. I followed this man for twenty years, at the end of which time a cataract matured in the other eye, and was expressed with a good result, without any signs of glaucoma having developed. Another patient of this old series, Case 2, who at the time of the report, had a spontaneous cure of cataract, with vision of 20/70, later developed glaucoma on account of the nucleus getting into the anterior chamber, and was cured by an extraction. This case should of course, be placed in a different class

from those in which the glaucoma is the direct result of the absorption of the lens without any dislocation.

In a third of these older cases, Case 3, a woman of sixty-five years, with nearly mature uncomplicated cataract, reported again after two years, with the cortex absorbed, a small nucleus sunk down so as to leave the upper third of the pupil free and the eye absolutely blind from glaucoma. The other eye had had a cataract removed ten years before with resulting vision of 20/50 and no signs of glaucoma in that eye; nor did any such signs appear in the next few years during which I kept track of her.

In some of my more recent cases I have an almost continuous record of the conditions before, during and after the occurrence of the glaucoma and the absorption of the lens.

Case IV, F. J. T., male, 47 years, seen first 3-29-1911. Right eye, mature cataract; V=hand movements three feet, good projection. Left eye, slight lens opacities, V=20/15—. After about three years, this patient was seen again and although the right lens, with undilated pupil, showed no decided change, its projection was found to be so poor that patient was advised that an operation would probably not be worth while. There was nothing unusual about the appearance of the eye and the tension was not tried at this time. In 1915 the tension became decidedly high (59mm.), with considerable pain and congestion. A trephining was done with some reduction in tension and disappearance of the pain and congestion. On 5-27-16 the tension was still high (51mm.) and it was plain that the lens was undergoing absorption; most of the cortex was absorbed and the iris was tremulous. Extraction and iridectomy were advised, but the case has not been seen since then. During the five years period of observation the other eye retained vision of 20/15 with absolutely no sign of glaucoma. I realize that this case could be quoted on either side of the question, but if the cataract had been examined with a dilated pupil when the projection was first found to be bad I



believe that signs of beginning absorption of the cortex would have been detected; and that the increased tension was the result of the continuation of this process.

The same remarks apply to

Case V, woman 54, seen by my colleague, Dr. Patton, on 6-25-1915. Right eye, cataract of some years standing, tension 51, cornea steamy, exact condition of cataract not ascertainable. V. not noted but very poor. Posterior sclerotomy was done and patient was not seen again until 5-31-16. She returned with an acute iritis in the right eye and was given atropin; a few days later I found the pupil dilated enough to show that the cortex of the lens had been absorbed and the small nucleus was low down in the posterior chamber. Later on it appeared in the anterior chamber and was removed with the loop, on account of persistent symptoms of irritation, although the tension had sunk to normal or thereabout. The eye was blind. The other eye had had a cataract removed from it eight or ten years previously and in 1917 showed vision of 20/30 + with no signs of glaucoma.

Case VI, male 69, first seen 6-15-14. Right eye, old milky looking cataract; projection poor; divergent strabismus. The projection of this eye was so poor that it was not deemed best to operate on it and as the left eye, in addition to cataract had dacryocystitis and ectropion of the lower lid, the sac was destroyed, the ectropion cured and after some months the lens expressed with a good result. While at the hospital, the blind right eye got painful and hard. A trephining was done but the hole was made too far back and the iris did not prolapse. The eye became painless but still had some tension on his return to his home in Montana. For the subsequent history of the case I am indebted to his home oculist, Dr. W. A. Walters of Billings, Montana, who wrote me that soon after he reached home he developed what seemed to be an irido-cyclitis in the right eye with some precipitation in the anterior chamber; high tension and steamy cornea. When the acute symp-

toms subsided, after a few weeks, the tension became normal, the sight began to improve, the cortex of the lens was found to be practically all absorbed, with a sunken nucleus; and the eye had vision of about 20/200 which has been maintained without any further increase of tension. The left eye continues good with no signs of glaucoma.

Case VII, male, operated by me for senile cataract of the left eye in 1906, at the age of 56; resulting vision 20/20+. The right eye became slowly blind from developing cataract in the course of the ensuing years but I did not see him again until 5-22-17 when he returned stating that on the day previous, the right eye (the unoperated one) suddenly became very painful and congested with diminution of what little sight he had previously had. I found the left eye to be still in perfect condition; V = 20/20+ with correction. The right eye was deeply congested, the conjunctiva slightly edematous, anterior chamber deep with greyish deposit at bottom, cornea hazy, pupil small, lens opaque, T + 2. V = light perception, no projection. The symptoms in this case were so violent that my first impression was that the eye had a beginning metastatic panophthalmitis, and the man was put on atropin, hot applications, inunctions of mercury and salicylat; and a corneal paracentesis was made twice a day for two days. At the end of this time all serious symptoms had disappeared, tension was normal, pupil moderately dilated, cornea and aqueous clear. It could now be seen that all the cortex except a little in the center had disappeared leaving the brown nucleus low down in the posterior chamber. The projection was good and two months later, during which time the eye had been perfectly comfortable, I made a forceps extraction of the nucleus in the capsule which gave him vision of 20/70 with correction, at the first test. There were a number of fine opacities in the vitreous, but no signs of glaucoma.

Keeping in mind the common symptoms of the last two cases, i. e., old



cataract, a sudden onset of tension with inflammatory symptoms; grey deposit in the anterior chamber, disappearance of the latter and restoration of useful sight with or without operation, I think it is fair to assume that a similar sequence has occurred in many if not all of the cases in which the combination of glaucoma with cataract cortex absorption has been observed. In some cases the absorption of the cortex seems to produce no increased tension. In many of these, however, where the cortex is absorbed or discharged into the anterior chamber a little at a time, it is probable that a transient increase of tension occurs but attracts no notice on account of the blindness from the cataract and the lack of pain. When the cortex escapes into the anterior chamber in any quantity, it seems to excite a decided chemotaxis, and where with irido-cyclitic symptoms, any of this cortex is seen in the chamber, it is natural to take it for inflammatory exudate. Whether the increased tension is due to direct blocking of the outlets by the cortex or is the result of the chemotaxis, or both, it is very difficult to decide; but I think there can be no doubt that the impression which some authors have gained that the spontaneous absorption of cataract is due to the occurrence of irido-cyclitis is based upon a misinterpretation of the congestive symptoms which accompany the absorption of the cortex, and is as erroneous as the belief that the absorption depends upon the occurrence of glaucoma.\*

The foregoing facts and conclusions may throw some light on the somewhat mysterious loss of sight which is said to occur in so many eyes in which the lens has been couched. The report is that such eyes nearly always go blind from irido-cyclitis or glaucoma even when they are operated aseptically; and it seems to me much more reasonable to suppose that these

results instead of being due to the bouncing about of the lens upon the ciliary processes are due to the chemotaxis or the increased tension which the absorption of cataractous lens matter apparently produces.

An interesting question is: What is the subsequent fate of eyes that have successfully passed the first danger of glaucoma from the spontaneous cure of cataract. We know that they are open to the danger of glaucoma from dislocation of the loose nucleus into the anterior chamber as shown in Case I; but there is also a question as to whether some harm may not result from the gradual breaking down and absorption of the nucleus. I have seen two cases of men about forty years of age with a hard nucleus in the anterior chamber, where there have been periodic attacks of intense pain, congestion and increased tension, with such complete absence of any trouble in the interim, that I have obtained the impression that these attacks were due to the sudden breaking down of the outer shell of the nucleus which, in the quiet periods, has been slowly prepared for the change.

It will doubtless be asked, why if hypermature cataracts are capable of causing such effects, we do not see more of the same sort of thing after the needling of soft cataracts; for after the initial glaucoma due to swelling of the lens and the release of debris which so frequently follow the first needling, the further process of absorption proceeds uneventfully. To explain this difference we must, for the present, appeal to the mechanical and chemical peculiarities of the hypermature cataract of adults. It may be the process is akin to the glaucoma which accompanies essential atrophy of the iris, i. e., the glaucoma in the latter class of cases may be due to the products of iris disintegration.

\* Since the above was written I have noticed the report by Schwenk in *Oph. Record*, Sept. 1917, p. 465, of a case of glaucoma from what he calls hyperreactive cataract. He has seen two other cases of the same sort and his views as to the production of glaucoma and inflammatory symptoms by a disintegrating senile cataract correspond entirely with my own.

## CONCLUSION.

The occurrence of glaucoma coincident with the absorption of hypermature cataract cortex in eyes otherwise healthy, together with the long continued absence of glaucoma from the fellow eye, makes it probable that the glaucoma which has been observed in connection with the spontaneous absorption of senile cataract is the effect, not the cause of such absorption. It follows that a senile cataract should be kept under observation and operated before it becomes too hypermature, even if the other eye still has good sight.

## DISCUSSION.

Marcus Feingold, New Orleans, said: About seven years ago I reported three similar cases, the report not being printed through my own fault. The picture was very much alike in all three instances, that of an acute attack of glaucoma; but the eyes showed deep anterior chambers. The aqueous was cloudy in all, and in one instance even a small hypopyon was present. The iris was discolored in all and tremulous in two cases. This, together with the milky, uniform capacity of the lens and the marked increased tension, helped in making the diagnosis. Speedy relief was had in all three cases by the extraction of the overripe cataract with resulting good vision. At the time of my report search of text- and handbooks failed to reveal any warning not to allow a cataract to become overripe, because it might result in an attack of glaucoma. As to the cause, irritation of the ciliary body by the subluxated, because shrunken, lens seems to be the only plausible explanation.

Edward Jackson, Denver, said that last year he had seen a case in a woman who had suffered from double cataract sixteen years

before. One eye had been operated upon, the other left to nature. He saw her two months before her attack of glaucoma. In the eye which had not been operated he found the iris tremulous and a Morgagnian cataract. She was given her correction for this eye with the hypermature cataract. But she came back in two months with an elevated tension. Miotics were of very little value. Atropin was very much better. She had a distinct irido-cyclitis.

Melville Black, Denver, said this danger of setting up glaucoma might point to the operative indications in such cases. He had seen three cases in which the second eye became cataractous later, with a good result in the first or operated eye. We should operate both eyes, he believed, and not let the second eye alone. Thus we could avoid letting the patient have a Morgagnian cataract with the evil consequences of a secondary glaucoma.

Harold Gifford (closing): We should watch these cases very carefully. We should operate the first eye, unless the patient is willing to take the responsibility of being sure that the second eye will last as long as he lives. Dr. Jackson's case developed glaucoma suddenly. Dr. Gifford believed that degeneration of the cortex did not necessarily produce the glaucoma. On the other hand, he could not agree with Dr. Feingold regarding the importance of traction on the ciliary body in producing the glaucoma. In one of Dr. Gifford's cases, the anterior chamber was deep and the iris pushed back. The nucleus was not causing any trouble. He did not believe the nucleus irritated the ciliary body, but he did believe that the toxicity of the lens cortex was a bigger factor. He expressed the opinion that the theory as to traction upon or irritation of the ciliary body had always sounded rather "fishy" to him in these cases. The pain comes on very suddenly and the eye is very red. A paracentesis gives relief quickly. He believed that the cortex probably undergoes degeneration and the toxic products absorbed from the lens produce the glaucoma.

1. Mitvasky. *Centralblatt f. p. Augenheilkunde*, Oct. 1892, 297.
2. Reuss, *ibid.*, Feb. 1900, 39.
3. Verrey, *abst. in Annals of Oph.*, Oct. 1916, 802.
4. Gifford, *American Journal of Oph.*, Oct. 1900.

# INJURY TO THE EYES FROM LIGHTNING STROKE.

WM. CAMPBELL POSEY, M. D.

PHILADELPHIA, PA.

A clinical paper including reports of two cases. Read before the Ophthalmological Section of the College of Physicians of Philadelphia, November 15, 1917.

In the latter part of July of this year, J. P., aged 14 years, was struck by lightning while he was leaning against the fireplace of a cabin in a boys' camp in Maine. The fact that the fireplace was provided with an iron stack was thought to have something to do with drawing the lightning, as the cabin was in the heart of a dense woods and surrounded by high trees. The lad was thrown to the ground by the violence of the stroke and rendered unconscious. The right eye was burned and the hair on that side of his face singed. About 48 hours after the injury, after he had recovered somewhat from the stroke, he was taken to Portland, Me., where he was seen by Dr. James A. Spalding, to whom I am indebted for the following notes:

"You will be much interested in the extraordinary case of J. P., who brings you this. He was struck by lightning July 21, and I saw him early on the 24th. The upper lid was much swollen and chemotic, the conjunctiva very much congested, and the pupil pinhead in size and vertically oval. The eye was so sensitive to light that vision could not be accurately tested. I dilated the pupil sufficiently with cocain to get a view of the fundus. There was a very faint scratch on posterior capsule of lens, media otherwise clear, and covering the entire field of observation was that milky white retinal exudate mentioned in the books as indicative of retinal concussion. I saw no detachment or hemorrhages and the visual field seemed normal in all directions. I gave him continuous hot packs for the swelling of the lid and a 1/5 per cent solution of atropin to keep down any possible iritis, as well as to enlarge the pupil in case anything should happen to the lens tissue. The case went on

uninterrupted under this treatment, though the single stria or scratch on posterior capsule of lens gradually increased to two and then to six and then became invisible as the substance in front became opaque. The striae ran diagonally and looked like the markings of a fine-tooth comb, or claw scratches, or delicate wrinkles.

"I gave him Crookes' lenses properly cylindrifed as by your pattern, and he has progressed favorably and can now use the good eye comfortably. I let him read a little after six weeks, and swim in a pool, the house physician seeing that the water was as free from germs as possible. This sort of enjoyment of life with a little exercise and a little reading has pulled him up physically very nicely. But in spite of any treatment the lens substance has gradually become more and more cataractous and the question now arises what to do. I should continue the atropin and watch what happens. Personally, I should operate on such an eye when it became quiet and imbibition had ceased. I cannot imagine that the lens substance would absorb of itself, but if it did not, then I would get rid of it by operation. He is young, and the lens substance is probably milky and would exude nicely without inflammatory results and with a small incision. It might even be removed by suction, which on the whole looks to be the best way."

The lad returned to his home in September, and I saw him shortly afterward, on the 21st day of that month. The eye was now quiet, but all view of the fundus was obscured by a fully developed cataract, the lens being uniformly opaque, the physiologic sectors being plainly outlined except below where they were obscured by the



capsule, which in this position appeared thickened and opaque. The pupil was of normal size and the iris reacted freely to light. Light projection and perception were good in all parts of the field of vision. The left eye was unaffected. A weak solution of atropin was prescribed for the cataractous eye and the patient counseled to avoid undue strain upon the left eye and too much exposure to light. Yesterday, four months having elapsed since the accident, and no signs of irritation having arisen during the two months that have passed since he has been under my observation, I performed a cautious needling upon the cataractous eye.

#### CASE II.

On June 21, 1911, H. A., 24 years of age, while looking out of a second-story window, the sash of which was raised during a thunderstorm, was suddenly blinded by a flash of lightning which struck in the yard not far from where he stood. A curious tingling ran through his body and for a short time all was black before his eyes. In about a quarter of an hour, however, his vision cleared somewhat and he was able to discern the movements of his hand when held several inches from his eyes. After examination and a brief residence (2 hours) in the Hahnemann Hospital, he was moved to his home in Atlantic City, his vision alternating between spells of blindness and the ability to distinguish hand movements. When seen by Dr. O. D. Stickney, of Atlantic City (16 hours after the accident), he complained of a heavy uncomfortable feeling in the back of the head, of smarting and burning in the eyes and of lachrimation. The eyes were examined with difficulty on account of marked blepharospasm, but beyond a slight injection of the conjunctiva and a marked contraction of the pupils, nothing abnormal was noticed externally, the irides reacting promptly to light stimuli. Vision equaled the recognition of hand movements at a few inches in front of the eyes. On account of the blepharospasm and the small size of the pupils,

ophthalmoscopic examination was unsatisfactory, but the media appeared clear and the heads of the optic nerves normal.

Cerebration was somewhat obtunded and the patient swayed to and fro if unsupported. There were distinct choreiform movements of the left arm and hand.

The patient was confined to bed. Cold compresses and boracic acid solutions were applied to the eyes and atropin instilled twice daily, bromid ordered and light excluded from the room. I saw the case in consultation a few days later (6/24/11). Cerebration had now cleared and the choreiform movements previously noted in the left upper extremity had disappeared. Vision in the right eye was limited to light perception, that of the left, counting fingers held immediately in front of the eye. As the blepharospasm had now cleared away, and the pupils were widely dilated by the mydriatic, the fundus could be carefully studied, and a diffuse haze and edema of both retinas discerned without difficulty. The margins of both optic nerves were slightly obscured and both papillae were hyperemic. There were no hemorrhages or extravasations and both lenses were clear. The treatment inaugurated by Dr. Stickney was continued, and 1/60 of a grain of strychnia administered three times daily. From Dr. Stickney's notes, which he has kindly placed at my disposal, I find that the haze and swelling of the retina slowly declined and vision steadily improved. On 7/7/11 fingers were counted at 12 feet with the right eye and 8 feet with the left. Colors could be differentiated and the patient appeared to have entirely recovered from the mental shock occasioned by the lightning stroke. On 7/28/11 vision was normal in each eye and the field of vision unrestricted. The subsequent course of the case has been uneventful, the patient being able to continue his business without ocular or general symptoms.

#### REMARKS.

Injuries to the eyes following lightning stroke are uncommon, though the

literature contains approximately a half hundred cases. The majority of the reporters cite some disturbance to the lens in nearly all of the cases, the changes in the structure ranging from localized opacities which remained stationary for years after the accident, to fully developed cataracts, which required various durations of time for their formation, the complete haze of the lens appearing in some instances within a few weeks; in others, several weeks elapsing before complete opacification occurred. The majority of the cases seem to have been in young individuals, the reason for which is not quite apparent.

As might be expected, a number of theories have been adduced to explain the development of cataract after lightning stroke, and a number of master minds in ophthalmology have been engaged in its elucidation. In 1882, Leber, who reported in that year a case of binocular cataract after lightning flash, concluded from a study of this case and from the others which had appeared in the literature up to that time, that the changes in the lens were due to direct physico-chemical action of the electricity upon the lens substance; in other words, to a catalytic action of the electricity, in consequence of which there occurred a coagulation of the albumin of the lens.

Yvert and others suggested that a rupture of the capsule determined the later haze of the lens, but this has never been substantiated by clinical or microscopic proof.

In 1886, Knies assumed that the lenticular haze was due to a direct burn of the lens in consequence of the high temperature and of the physicoelectric influence of the flash upon the nervous tissues. He thought also that there was a similar action upon the contractile elements of the muscles and blood vessels, all other changes, such as will be referred to presently, being secondary.

Hess, however, has probably deduced the proper theory of the lens changes in this class of cases, and those who are interested will do well to read an account of the experimental work which

he performed on the eyes of rabbits subjected to artificial lightning stroke, which is fully reported in this classis chapter on the lens in the 2nd Edition of the Graefe-Saemisch Handbuch. It will suffice at this time to quote his conclusions, admirably abbreviated and expressed by Fuchs in the last American Edition, and also evidently subscribed to by this eminent authority, "The opacities of the lens and atrophy of the optic nerves. . . . (which occur after lightning) are produced not like the external injuries by the action of heat, but by the power possessed by the electric discharge to kill living cells even without the development of heat." Hess has proved this for the lens, showing that by electric shocks the epithelium of the lens capsule is made to die, the result being a clouding of the lens.

In addition to the changes in the lens, injury to the optic nerve is not uncommon in this class of cases and Stillson in an excellent article entitled "Cataracts Produced by Shocks from the Commercial Electric Current," which appeared in *Northwest Medicine* in February, 1907, has catalogued a number of such instances. Thus, "neuritis and optic atrophy were reported by Leber, Pagenstecher, Laker and Vossius; anemia of the optic nerve by Uhle; rupture of the choroid and detachment of the retina by Reich; hemorrhage or infiltrates of some kind in the region of the macula and the pupil by Downar, Reich and Laker; ptosis by Sämisch, Power, Pagenstecher, Knies, Uhle and Nagel; opacities of the cornea by Vossius, Knies and Sillex; soreness in the extrinsic muscles by Sämisch; mydriasis by Henrotay and Uhle; myosis by Pagenstecher and Laker; paresis of accommodation by Uhle and Nagel; iritis by Knies; iridocyclitis by Vossius; photophobia by Maclean, Purtscher, Vossius, Meyerhofer, Sillex and Nagel."

As to the systemic symptoms in these cases, Stillson added the following: Burns of the first and second degree, paresis of the extremities, hemiplegia, anesthesia, aphasia, anuria.

In the presence of such complications the prognosis for the restoration of vision by operation in cataract after lightning flash must necessarily be guarded. Naturally no procedure should be essayed without the assurance of a satisfactory field of vision, and the probability of a healthy fundus. Light fields are, however, misleading, and it would appear wiser to defer a definite opinion as to the future usefulness

of the organ until the lenticular haze has been entirely removed and a view of the fundus thereby obtained. One fact appears certain, that no form of operation should be attempted until every trace of ciliary irritation has subsided. A cautious needling appears to me to be the operation of choice and to be preferred to any form of procedure which aims at the complete evacuation of the opaque matter at one sitting.

## MEMBRANOUS CONJUNCTIVITIS OF OVER FOUR YEARS' DURATION.

H. H. STARK, M. D.

EL PASO, TEXAS.

Report of a case in which the conjunctival condition was associated with skin disease, probably erythema multiforme. Cure under solution of quinin sulphat. Read before the Third Colorado Ophthalmological Congress, August 10th, 1917, with discussion.

In a review of the literature, we find that the term "membranous conjunctivitis" has been in use for many years. However, as our knowledge of bacteriology has increased it has become a less comprehensive term, describing as it does a condition rather than a definite pathologic process.

The condition may be due to infection by many of our well-known microorganisms, such as diphtheria bacilli, streptococci, etc., to chemical agents such as nitrat of silver and other caustics, or to trauma of the mucous membrane, illustrated in many instances by the exudate following an operation on the conjunctiva.

Some authors divide the condition into two forms, basing the division on the general appearance rather than etiology. The term croupous is applied to those cases having a small amount of membrane, slight swelling, no invasion of the lid, where healing leaves no scar; diphtheritic to those cases where there is a large amount of exudate, marked swelling, deep involvement of the lids, with scarring.

It is a generally accepted fact that this division means very little as to

etiology, since there may be a very slight involvement with the most virulent infection, while the severe form may be caused by a type of infection which is ordinarily mild. Some authors term all forms "pseudomembranous."

It might be better to drop the term membranous altogether, and speak of the type of infection or cause of the condition, were there not cases which cannot be classified in any other way, and it is such a case that I have to report. This case, to me, has an interest from the standpoint of the obscure etiology, the long duration and the method of cure.

### CASE.

E. K., female, age 11 years, came under my care on September 18, 1909, with the following history: Father, mother, and three sisters living, all in good health; normal birth, but had never been considered a strong child, the condition being ascribed to chronic tonsillitis rather than to any definite disease. At the age of four and a half years, was infected by poison ivy, the eruption lasting for a number of days, finally disappearing. At the age of six



years, she had a tonsillectomy performed by a competent surgeon, with good results. Two months later she developed diphtheria, which responded to one injection of antitoxin, the child making a good recovery and was well for two months, when she developed a slight fever with an eruption resembling measles. The eruption, with low grade fever, continued for three weeks, when large oval blebs, with thick covering and filled with serum, began to form on top of the previous eruption, increasing in number over the body, and finally, at the end of four weeks, appearing on the face.

At this time, the eyes, mouth and throat became involved. The disease apparently responded to no form of treatment, the blebs being opened with scissors and the serum allowed to escape. At the end of seven weeks the condition began to improve on the body, finally healing, leaving no scars, but for a number of months spots could be noticed at the time of taking a warm bath.

During the attack the lids were much swollen, with a discharge of pus from the eyes. On the mouth and throat there were large whitish spots, undoubtedly broken down eruptions. The eyes were the last to heal. Finally after several weeks treatment, the improvement came to a standstill, leaving the eyes red and weak and the inside of the lids whitish in appearance. The mother said the eyes had been treated for a long time, with medicine answering the description of nitrat of silver and copper sulphat—with apparently slight improvement. During the later part of the treatment, there was no change, and as the treatment was decidedly painful it had been stopped.

The condition then shown had been present for over four years.

Examination showed the vision in each eye to be two or three letters in the 20/20 line, slight entropium of all lids, many cilia missing. Each lower lid, when everted, showed a whitish coating, very faintly gray, on the tarsal conjunctiva only, no other part of the eye being affected. With a cotton applicator, this coat could be removed,

coming off as a distinct membrane, at times in very large pieces, leaving a smooth, red surface covered with lines of cicatricial tissue, but no bleeding or granulations. This coating was removed several times, each time reforming within twenty-four hours. The line of cicatrices ran parallel with the lid margin, and in each eye a band was attached to the point near the inner canthus, which became more pronounced with forcible eversion of the lids. The upper lids were stiff and rather hard to evert, showed considerable scar tissue but no membrane. The right cornea showed slight nebulae in several spots; the left showed lower one-fourth to be decidedly cloudy, with a number of superficial vessels. The pupil reaction was normal. Both pupils dilated evenly, showing no synechia. No fundus change was found.

Laboratory examination of the membrane showed xerosis bacilli and fibrin.

I found that the case had excited considerable attention among the medical profession at the time of the attack, and that many physicians had been called in consultation. In personal conversation with two of them, I found that the diagnosis had varied from measles, scarlet fever, ivy poison, to some undiagnosed skin disease. As no dermatologist saw the case, a definite diagnosis had not been made.

In considering the etiology, I think that exanthemata may be excluded. Two causes must be considered: (1) Rhus poison, as the child gave a history of having at one time been sensitized, but the general history of the case in no way resembles any ivy poison that I have ever seen; (2) anaphylaxis following diphtheria antitoxin. As one dose only was given in this case, it is doubtful whether it could have been the cause, the rash appearing two months after injection—and it is decidedly unusual to find a reaction coming much after fifteen days, at most one month after the injection.

In considering the skin diseases I find that we have probably four presenting bullae; dermatitis herpetiformis, impetigo contagiosa, pemphigus, and erythema multiforme. Of these,

I think the first two can be excluded in considering this case; dermatitis herpetiformis, by the absence of severe itching and by the eruptions in this disease usually appearing in groups and of irregular shapes; also impetigo contagiosa, because the walls of the bullae are extremely thin and easily broken, and because of its contagious nature. Neither of the two above conditions appears on the mucous membrane of the mouth and throat. Pemphigus is by far the most common disease of this type to attack the eyes, but I believe this also can be excluded, from the fact that the bullae develop from a healthy surface; the attack is usually very severe; the history of the case is of long standing, lasting many times for years. Where the eyes are involved, there is a decided scarring, with the forming of symblepharon; the usually marked shrinking of the conjunctiva, the process usually going on to complete destruction. Erythema multiforme begins with a slight fever; the skin lesion may be of any type and change from one to the other as it did in this case, from a macular eruption into bullae. The wall of the bleb is fairly thick, with no tendency to rupture; it frequently attacks the mucous membrane of the mouth and throat, and there is a history of complete recovery.

It is my belief that the last named disease is the primary cause of the condition in this case. However, this affection is not common, as in looking over the Year Books of Ophthalmology, from 1904 to 1916, I find only two cases were reported of membranous conjunctivitis due to erythema multiforme, these being reported by Salus in 1912.

In considering the therapy of the

case I found that the caustics were contraindicated, owing to the fact that they might at times produce practically the same condition, also that they had been tried in this case with no appreciable result.

In consulting the American textbooks, I was not impressed with any of the remedies offered. I found that two English authors, Nettleship and Parsons, recommended the solution of quinin sulphat locally in membranous conjunctivitis. So I decided to try this preparation, which is made by dissolving three or four grains of quinin sulphat in the smallest amount of dilute sulphuric acid, U. S. P., that can be used, which is generally one drop of acid to a grain of the salt. To this is added sufficient water to make an ounce. Several drops should be used in the eye daily.

The use of this remedy was commenced without removing the membrane, and there was a decidedly noticeable thinning of the exudate within ten days. It entirely disappeared from the right eye within four weeks, and from the left within six weeks, with the exception of a small thin spot about two by three millimeters in extent near the lid margin, which has persistently remained. There has been no return of the exudate up to the present time, eight years.

Just what effect the remedy might have had on the acute condition, I am unable to say, but it certainly acted promptly in the later stages of the disease, and has special significance at the present time, owing to the recent introduction of the new quinin-copper salt ethyl-hydro-cuprein, and I feel it should be given a trial in conditions other than in the case reported.

#### LITERATURE CONSULTED.

- Ophthalmic Year Book, 1904 to 1916.
- Roemer Textbook of Ophthalmology, Foster's translation, 1913.
- Fox, Practical Treatise on Ophthalmology, 1910.
- de Schweinitz, Disease of the Eye, 7th Edition.
- Fuch's Textbook of Ophthalmology, 4th Edition.
- Nettleship, The Student's Guide to Diseases of the Eye, 1887.
- Parsons' Diseases of the Eye, 1907.
- Schamberg, Diseases of the Skin and Eruptive Fever, 3rd edition.

## DISCUSSION.

Marcus Feingold, New Orleans. It is unfortunate that in the case reported the skin condition was not seen by the dermatologist, though no reason exists to dispute the diagnosis of Dr. Stark. Yet it is possible that the eye condition may have had another interpretation. The following case is of interest in connection therewith. A young woman of low mentality, aged about 25 years, appeared at the Touro Infirmary Out-Patient Clinic with a chalazion on the left upper lid, telling that she had been taking some medicine and using a lid ointment prescribed by her physician. On everting the lower lid a white opaque area was found in the conjunctiva of the lower lid and fornix near the inner canthus. The suspicion at once arose that we were dealing with a burn of the conjunctiva occasioned by the use of mercury while the patient was taking iodid of potash. Acting upon this, only bland treatment was used, but the condition remained unchanged during the next few days, possibly the area getting somewhat smaller.

A few days later to our great surprise the opaque necrotic area appeared much larger, the balance of the conjunctiva, at the same time, being remarkably free from symptoms of inflammation. Soon a similar smaller spot was discovered in the other eye in the identical location. The former diagnosis was now abandoned and the strong suspicion of induced conjunctivitis arose. Pharyngeal reflex was found entirely absent and the neurologist reported the patient suffering from dementia praecox. During the

next four or five weeks the condition remained practically unchanged but for some slight exacerbations and remissions first in one eye, then in the other one. Admitted to the hospital for observation and close watching, and without any local treatment, the conjunctiva returned to normal within a few days and remained so during the whole stay of six weeks in the hospital. In the case of Dr. Stark it is possible that the condition began as described; but that the child being made the center of attention in the family, may have kept up the irritation to maintain this interesting position.

Harold Gifford, Omaha, Nebraska. The fact that Dr. Stark's case extended to the upper tarsus would be against the idea of malingering.

H. H. Stark, El Paso, Texas. My experience of malingering is that the disturbance is more apt to be on the temporal than on the nasal side. I think it is absolutely impossible for malingering to have occurred in this case. Fuchs calls attention to the fact that the condition may exist over many years. The child is the daughter of our mayor, and her mother is a very intelligent woman. The child had not had any attention called to her eyes for four years, all treatment having been omitted.

Dr. Gifford asked whether Dr. Stark had tried staining with fluorescein after removing the membrane. Dr. Gifford had found fluorescein as useful in the conjunctiva and in the fornix as on the cornea.

H. H. Stark (closing). No. There were no granulations, but there might perhaps have been some staining.

## CORNEO-SCLERAL TREPHINING.

C. A. CLAPP, M. D., F. A. C. S.

BALTIMORE, MD.

A report of five cases subjected to this operation which resulted in as many disappointments.

While the operation of corneo-scleral trephining is theoretically ideal, and in many hands seems to elicit only the highest terms of commendation, in others, there have been noted subsequent complications which have caused disappointing end results. I think our experience has been unusual in that all cases operated upon have proven in the long run to be disappointing. While I say *all* cases and then show that this is only five in number, still there are certain features about some of them that make them of considerable interest.

Some of the unsatisfactory conditions that have been reported are: Late infection, latent iritis, fulminating glaucoma, and hypotony with poor vision; all of which have occurred in this series of cases.

Following is a brief report of case histories with comments:

Case I.—W. S. Colored. Age 55. Presented himself October 7, 1912, with an acute glaucoma in his right eye following a blow upon the eye, left eye showed absolute glaucoma. Myotics failing to reduce tension, even in ab-



sence of light perception, it was decided to trephine. The operation was performed February 3, 1913, with a small iridectomy. Healing was uneventful, but the trephine opening seemed to fill with organized exudate, and tension to increase until March 3, 1913, when a tension of plus three, (fingers), was noted. No pain being experienced, nothing further was done, and the patient failed to report thereafter.

Case II.—P. R. Hebrew. Age 25. January 27, 1913, gave history of poor vision in left eye for one month, with pain for the past week. Examination shows deep anterior chamber, floating opacities in vitreous, myopic crescent about each nerve, left nerve decidedly cupped and pale.

Myotics ordered.

$$V = \frac{\text{O.D.} - 16 = 15/40}{\text{O.S.} - 14 = 15/40}$$

Tension O.D. 15 mm.  
O.S. 40 mm.

Tension remaining high; on February 13, trephining of left performed. There was only moderate reaction.

On February 26,

Tension O.D. 18 mm. Hg.  
O.S. 18 mm. Hg.

On March 24,

Tension O.D. 30 mm. Hg.  
O.S. 40 mm. Hg.

April 14, left pupil dilated. Tension 50 mm. Hg. Tension remained high even under myotics.  $V =$  in O.S. on January 28, 1914, was 2/200, nerve becoming more atrophic.

March 16, 1914, patient returned with a violent attack of acute conjunctivitis. March 18, 1914, the marked bleb over trephine opening had broken with flattening, and extensive fibro-purulent exudate filled anterior chamber. Under treatment in the hospital the eye cleared up so that on April 1, 1914, it showed clear anterior chamber, large floating opacities in vitreous, tension reduced, nerve white, and vision hardly more than fingers. We have been unable to get the patient to report for further examination.

Case III.—E. K. White, widow. Age 62. On March 3, 1913, gave history that left eye was operated on twelve years ago for failing vision without re-

sult. That vision in right eye has been failing for six months, and she has been using drops from a hospital for the same. Examination showed operative coloboma upward in left eye with absolute glaucoma. Right eye showed simple chronic glaucoma with pitting, but normal tension. Continuance of myotics ordered. Tension 20 mm. March 19, 1913, tension O.D. 50 mm. Blood pressure 220. Patient ordered stronger myotics and blood pressure treatment, tension still remained above 40 mm. Hg., and in view of the unsuccessful iridectomy on left eye trephining was advised for right, which was performed May 26, 1913, using  $1\frac{1}{2}$  mm. trephine. Eye did well for two days, when fulminating glaucoma developed and eye was lost, to absolute glaucoma.

Case IV.—M. O'N. White man of 56. July 19, 1913. Gave history that left eye had been failing for several years and right for six months. Had been under care of a recognized oculist. Examination showed simple chronic glaucoma in each eye with tension of O.D. 37 mm. Hg., O.S. 40 mm. Hg.

$$V = \frac{\text{O.D.} + 1.75 = 20/20}{\text{O.S.}}$$

Fingers in temporal fields. Patient was treated by eserine and pilocarpin until December 4, 1913, with no loss of vision and tension below 35 mm. Hg. Upon the advice of Colonel Elliot a bilateral corneo-scleral trephining was performed by the Colonel. There resulted very little reaction and tension soft.

On February 6, 1914,  $V = \text{O.D. } 20/100$ , O.S. Motion.

On May 4, 1914, tension was O.D. 13 mm. Hg., O.S. 13 mm. Hg.

March 24, 1915,  $V = \text{O.D. } 20/100$ , O.S. Motion.

May 20, 1917, patient returned with small areas of infiltration in upper part of right cornea. No change in vision.

Case V.—K. K. White, female, single. Age 37. July 3, 1913. History of failing vision in each eye for some time.

$$V = \frac{\text{O.D. } 15/200 \quad 2.25 = 15/40}{\text{O.S. } 15/200 \quad 2.25 = 15/40}$$

Diagnosis: Simple chronic glau-

coma with cupping and contracted fields, worse in right.

Tension O.D. 37 mm. Hg.  
O.S. 37 mm. Hg.

Left field showed greater contraction and also less effect from myotics and so left eye was trephined on February 23, 1913.

March 10, 1914, tension finger normal with vision in O.S. of 20/50 plus.

April 8, 1914,

Tension O.D. 25 mm. Hg.  
O.S. 9 mm. Hg.

Operation upon right eye was advised and thinking it gave a good opportunity to note the relative merits of trephining against iridectomy the older operation of iridectomy was performed on right eye May 12, 1914.

June 11, 1914, with correction,

V = O.D. 20/80  
O.S. 20/30

On July 20, 1914, patient returned complaining of some pain in left eye, which showed some ciliary congestion. Patient did not report again until August 7, 1914, when well-marked case of iritis was present in left and atropin ordered.

March 10, 1914,

Tension O.D. 20 mm. Hg. with al-  
O.S. 17 mm. Hg.

most complete posterior synechia and beginning opacity in lens of left eye. Atropin viii gr. ordered. March 29, 1915, left lens completely opaque.

July 20, 1915, removed lens by incision above, slight loss of vitreous. Cornea started to become opaque from above and has continued until most of tissue is opaque and vision of light perception only remaining.

April 16, 1917,

V = O.D. with correction 20/100++  
O.S. Light perception.

July 19, 1917, left cornea steamy. Tension plus. Enucleation advised.

#### COMMENTS.

Case I. This was our first experience with the operation of trephining and not a very favorable case. The operation was performed to see if the ten-

sion would remain lowered without expecting restoration of vision. But neither was there permanent lowering of tension nor restoration of vision.

Case II. This case showed satisfactory lowering of tension for the first month; but it did not remain permanent even with the presence of a patent opening, with marked bleb over opening; and later showed a typical late infection, just about one year after the primary operation. Although the anterior chamber infection cleared up the vision was not restored.

Case III. This case one would have thought to have presented proper indications for the corneo-scleral operation, as iridectomy had failed on the left, and myotics failed to keep tension down in the right. Later writings and our own experience tend to make us think we erred in using the smaller trephine, although we believe that this represents one of those fulminating cases where all procedures are without results.

Case IV. The first three cases did not have the same skill in execution that this case had and yet the filtering scars were all present and could be demonstrated by pitting. This case had a vision of 20/20 in the O. D. and the tension was kept down with myotics prior to operation. Since operation there has been even hypotension but the vision has never been better than 20/100. Would not this case have done better under prolonged myotics? Does not the beginning corneal infiltration result from the hypotension? Certainly we can find no fault with the operative technic.

Case V. This case probably presents better conditions for our experimental control than any of the others. The Elliot operation was performed on the better seeing eye. The filtering scar and resulting hypotension were perfectly satisfactory; and yet a latent iritis developed five months after the operation with subsequent blindness; while the old classic van Graefe iridectomy on the worse eye, still retains useful vision and satisfactory tension.

CONCLUSIONS: First — The corneo-





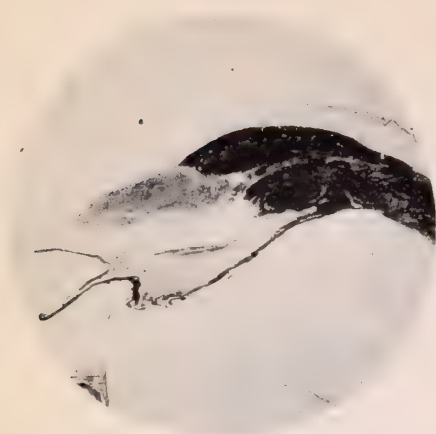


FIG. 1, CASE I.—NOTE POSITION OF TUMOR, AND LACK OF PIGMENT IN ANTERIOR THIRD.

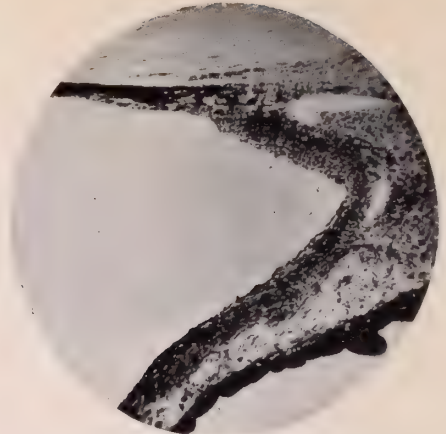


FIG. 2, CASE I.—ANTERIOR SURFACE OF IRIS, POSTERIOR SURFACE OF CORNEA AND ANGLE OF ANTERIOR CHAMBER COVERED WITH TUMOR CELLS.



FIG. 3, CASE I.—ECTROPION OF PIGMENT LAYER OF IRIS.

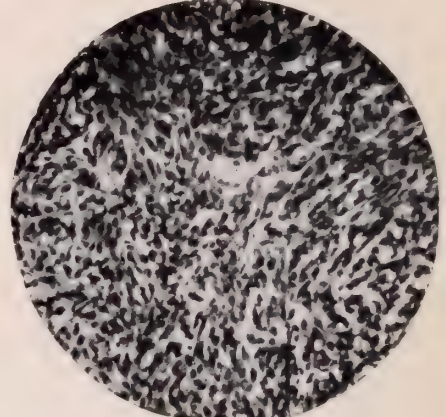


FIG. 4, CASE I.—AREA FROM UNPIGMENTED EPIBULBAR PORTION OF TUMOR.

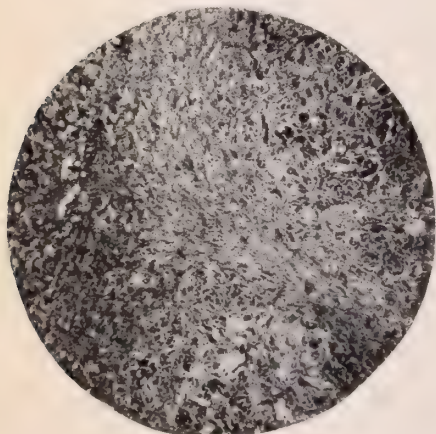


FIG. 5, CASE II.—SECTION FROM METASTATIC NODULE IN LIVER.



FIG. 6 CASE III.—GROSS SPECIMEN NOTE TUMOR ON OPTIC STALK.

MELANOBLASTOMA OF THE EYE.  
FORMAN AND HUGGER.

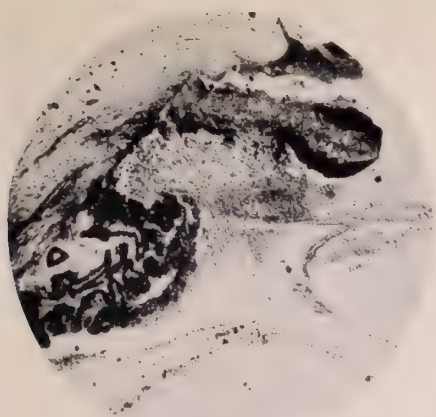


FIG. 7, CASE III.—IRIS BOUND TO CILIARY BODY BY GRANULATION TISSUE.

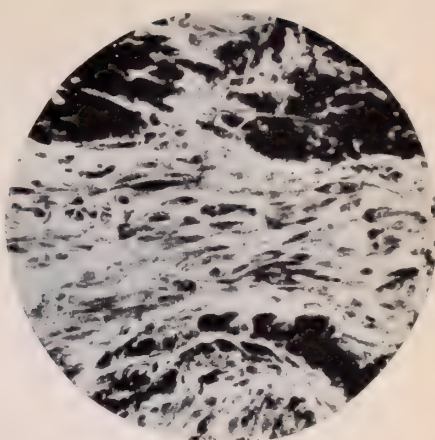


FIG. 8, CASE III.—TUMOR IN OPTIC NERVE. INFILTRATING SPINDLE CELLS CONTAINING PIGMENT, SUPPORTED BY TISSUE OF THE PART.

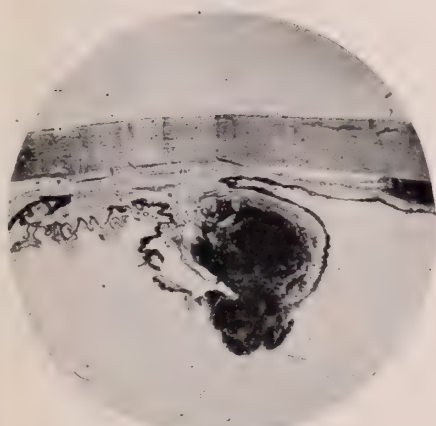


FIG. 9.—TUMOR IN POSTERIOR PART OF CILIARY BODY.

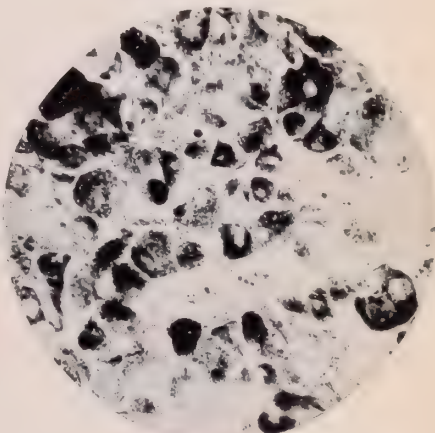


FIG. 10, CASE IV.—VARIATIONS IN SIZE AND SHAPE OF CELLS.

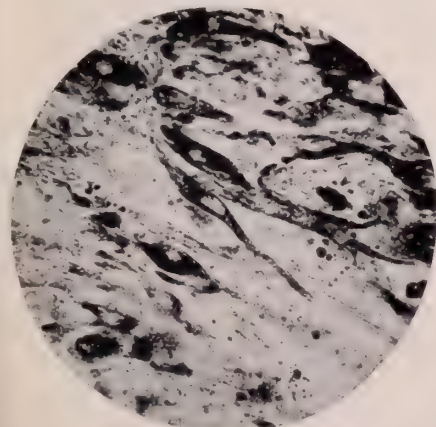


FIG. 11.—TUMOR CELLS WITH NET-WORK OF TISSUE CELLS INTERSPERSED.

MELANOBLASTOMA OF THE EYE.  
FORMAN AND HUGGER.





scleral trephine operation for glaucoma has late results which may develop even years after the operation.

Second—That rarely if ever should it be the operation of choice.

Third—That it should be tried where iridectomy has failed.

Fourth—Some reports in cases of buphthalmos would seem to warrant further trial in this condition.

## MELANOBLASTOMAS OF THE EYE.

JONATHAN FORMAN, M. D., AND C. CLARON HUGGER, M. D.

COLUMBUS, OHIO.

Studies from the Laboratory of Pathology of the Ohio State University. Supplemented by clinical notes regarding the four cases reported; and reasons for preferring the term melanoblastoma to the more commonly used sarcoma of the uveal tract.

Tumors of the choroid may be either primary or secondary in origin. Primary growths are the more frequent and the large majority of these are composed of pigment producing cells.

The pigment bearing choroidal tumors are usually referred to as melanomas. In this region pigment-free tumors are sometimes observed which differ in no wise either in structure or clinical course from those which contain pigment. Such tumors have been collected by Schieck<sup>1</sup> under the term leucosarcoma. This would appear to be an unfortunate term, because it is used by Sternberg and others to designate those cases in which a definite tumor-like mass is developed in some organ or tissue; and is composed of *lymphoid* cells which seem to escape into the blood stream, giving rise to leukemic alterations of the blood. Ribbert designated both the pigmented and the pigment-free tumors of this group as *chromatophoromas*. Mallory adopted the more euphonious and equally comprehensive term of *melanoblastoma*. The use of a group name for all tumors composed of melanoblasts, or chromatophores, has the advantage of not placing any emphasis upon benign or malignant forms. This compels a more careful study and accurate evaluation of the individual tumor.

Marshall<sup>2</sup> in his collection of 134 cases of melanoma of the eye, found that the age ranged from 15 to

90 years with an average age incidence of 50 years. One eye, as a rule, is affected. The cases on record appear to be about equally divided between the left and the right eye. Injury is considered as an important etiologic factor by some authors. Marshall found a definite history of injury in about ten per cent of his series. Among the fifty-five eye specimens in the Museum of Pathology at the Ohio State University, there are four cases of melanoblastomas arising in the eye.

### CASES.

Case I. *Clinical Notes:* A white woman, aged 30, consulted an ophthalmologist on October 8, 1914, because of pain and loss of vision in the right eye. Upon the appearance of a dark area on the upper surface of the globe of this eye about three years before, the vision of the patient began to decline. This area increased in size, bulged slightly, and was attended by an excruciating pain throughout the entire period. The patient recalled rather indefinitely having received an injury to the right frontal region. Ophthalmoscopic examination of the right eye revealed a normal fundus reflex. The details of the fundus were imperfect. There was a marked cupping of the disc. This was verified by the indirect method.

Removal was advised and the eye was enucleated October 9th, 1914, under ether anesthesia. The patient made an

uneventful recovery and left the hospital on the 15th of October. In June, 1916, the patient died with the symptoms of a generalized sarcomatosis. No autopsy, however, was permitted.

*Pathologic Notes:* Upon gross examination the eye is spherical and presents a diameter of 2.5 cm. The cornea is clear and apparently normal. On the upper surface of the eye extending from the sclero-corneal junction back to the equator and measuring 1.5 x 1 cm. is a blackish area. At the equator, this gradually blends into the sclera.

Upon section, the blackish area is revealed as the outer surface of a tumor mass occupying the ciliary body and the anterior portions of the choroid and sclera. The anterior one-third of the tumor mass does not contain pigment while the remainder is a dark brown.

Upon microscopic examination, sections from the side of the tumor present an iris which is decidedly shortened. The pigment coat has curved over onto the anterior surface of the iris in the process of shortening, forming in this way a fish hook figure. The muscle of the ciliary body is destroyed and replaced by tumor cells. The tumor cells are spindle shaped associated with a varying amount of pigment. In the tumor mass just posterior to the ciliary region, the tumor cells are so deeply pigmented that their nuclei are hidden and the outline of the cell is obscured. In the ciliary body, the tumor cells are spindle shaped and present but little pigment. The tumor begins at the equator and extending forward, at a point opposite the ciliary body it passes on either side of the sclera leaving it free from invasion. Over the outer surface of the sclera, the tumor mass extends for a distance of 2 mm.

To summarize, the tumor is a malignant melanoblastoma taking its origin in the choroid coat of the right eye. This tumor came to operation because of the pain associated with it.

Case II. *Clinical Notes:* A white man aged 34 years consulted his family physician about two years before his death because of a "bulging of the left eye." The physician made a dia-

gnosis of malignancy, and referred the case to an ophthalmologic surgeon who removed the eye. The patient made an uneventful recovery and remained well until May, 1916, when he noticed an enlargement of the abdomen and weakness upon exertion. He again consulted his physician and was referred to a general surgeon who viewed the case as hopeless and refused to operate. He grew rapidly worse and died on the 18th of July, 1916.

*Pathologic Notes (abst.):* The autopsy revealed a liver about twice its normal size. This enlargement was due to the presence of pigmented tumor nodules. Since the autopsy was complete and no other possible origin for the primary growth was found, it seems reasonable to conclude that the tumor of the eye was the primary growth, even though no pathologic study of that eye is available.

Microscopic examination of the liver reveals tumor nodules composed of cells varying in shape, size, and the amount of pigmentation. These cells are supported by a rather liberal amount of stroma. In some of the larger nodules, this is quite marked, so that nests of the tumor cells appear to be buried in a dense connective tissue, giving an alveolar arrangement to the tumor. Here the tumor cells tend to be spherical in shape and have only a small amount of pigment associated with them. In the smaller and more isolated nodules the tumor cells are of a spindle shape and have produced much more pigment.

To summarize, there is a melanoblastoma involving the liver. The eye had been removed on account of a tumor. Although we did not have the opportunity of studying the specimen from the eye, it seems certain that this tumor was the primary growth, since the autopsy eliminated other possible points of origin. This case is similar to that recorded by Adams<sup>3</sup> and others. The liver is a favorite seat of metastases.

The following two cases have been in the museum for some years and lack



both histories and pathologic notes. The descriptions are made entirely from the specimens of one-half of each eye and from the celloidin blocks and microscopic sections. Both specimens have been cut to supply the teaching loan collection of the laboratory<sup>4</sup> so that many microscopic sections are available for study.

Case III. The eye, after fixation, presents an antero-posterior diameter and a vertical diameter of 2 cm. each. The external examination reveals nothing worthy of note except the presence of a nodular ovoid swelling about 1 cm. in diameter and extending along the optic nerve for a distance of 1.5 cm.

The sectional view presents an apparently normal cornea. The aqueous chamber is filled with a mass of greyish material, which extends to and covers the anterior surface of the lens immeshing the iris and ciliary body. The lens is normal in appearance. The sclera is not remarkable. In the vitreous cavity on the one side, there is a mass similar in appearance to the one seen in the aqueous chamber. This extends from the ciliary body to slightly behind the equator. On the other side, the choroid coat is apparently thickened to 3 mm. This thickening extends around and across the fundus to within 1 cm. of the greyish mass on the opposite side.

Microscopic examination reveals the mass in the aqueous chamber to be a fibrinous exudation. The lens is not remarkable. The iris is composed of dense connective tissue and a few blood vessels and is decidedly shortened and thickened. The pigment layer has been drawn over the anterior portion of the iris. The posterior surface of the iris is intimately attached to the ciliary body and its processes by granulation tissue. This granulation tissue contains pigmented cells from the iris. The ciliary body is flattened against the sclerotic coat. The greyish mass in the vitreous cavity is also a fibrinous exudation. The retina has been dislocated by the exudation. The choroid is normal until the equator is reached, when it gradually broadens out into the tumor mass. This mass involves

the other coats of the eye in the region of the optic nerve. It passes into the optic nerve head and extends on inward forming the tumor nodule seen on the optic stalk. This tumor is composed of spindle shaped pigmented cells, supported by the tissue cells of the part. It presents the typical picture of an infiltrating sarcoma plus pigmentation.

To summarize, this is a typical specimen of melanoblastoma arising in the choroid and invading the optic nerve.

Case IV. Eye of a white male American. Clinical Diagnosis: Melanosarcoma of the eye.

*Pathologic Notes:* Since the eye presents nothing noteworthy, except the tumor, which is a small circumscribed nodule, the description will be confined to the tumor. It is a brownish mass, measuring (after fixation) 4 mm. in diameter. It appears to take its origin in and projects from the posterior portion of the ciliary body.

Microscopic examination shows that the posterior portion of the ciliary muscle has been displaced inward and forward. The ciliary processes and the iris are normal in structure, but are displaced forward so that the angle of the anterior chamber is acute but not obliterated. The tumor mass is circumscribed. It is covered by a thin layer of uveal pigmented cells and one of the cells of the pars ciliaris retinae. The tumor cells vary greatly in size and are round or polyhedral in shape. They all contain granules of brownish black pigment. Interspersed between the tumor cells is a scant network of the cells of the part. In certain of the sections, the pigmented cells of the tumor are continuous posteriorly with those of the choroid.

To summarize, this tumor is a small, fairly definitely circumscribed but not encapsulated melanoblastoma arising in the choroid coat.

Four specimens of malignant melanoblastomas arising in the choroid are here recorded. Most cases show a gradual loss of vision with the progressive involvement of the eye by the growing tumor. Fortunately these four speci-



mens illustrate in detail the four arbitrary stages of the disease mentioned by Adams<sup>3</sup> and Alter,<sup>5</sup> viz.:

1. Case 4 presents a comparatively small tumor which has not involved the eye to any great extent.

2. Case 1 presents a larger tumor coming to operation because of the pain.

3. Case 3 presents an excellent example of extraocular involvement in

which the tumors have grown into the optic stalk.

4. Case 2 is a study of the liver in an instance of melanosarcoma. These tumors frequently metastasize from the eye to the liver and to the lungs.

In conclusion the authors wish to acknowledge their indebtedness to Drs. C. F. Clark, Ivor G. Clark, Arthur M. Schaeffer, and H. R. Wright for the use of the material upon which this study is based.

#### REFERENCES.

1. Schieck. Melanosarkom als einzige Sarkomform des Uvealtrakts. Wiesbaden, 1906.
2. Marshall. Roy. Lond. Ophthal. Hosp. Rep. v. 15 p. 51.
3. Adams. A Case of Melanotic Sarcoma Arising in the Eye, with Metastases; Autopsy Findings. Boston Med. and Surg. Jour. May 31, 1917.
4. Scott and Forman. The Use of a Loan Collection and Photomicrographs in the Teaching of Pathology. Jour. Am. Med. Assn. Oct. 9, 1915, p. 1273.
5. Alter. Melanotic Sarcoma of the Choroid. Ohio State Med Jour. January, 1912.

## THE ROLE OF THE DUCTLESS GLANDS IN OPHTHALMOLOGY

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A general review of the subject with three illustrative cases. Read before the Third Colorado Ophthalmological Congress, August 10, 1917, with discussion.

That the eye is influenced by the secretion from the ductless glands we know; but just how, when or what changes are produced in each case, we do not always know so well. Likewise we know relatively little concerning the chemistry of the internal secretions, in spite of the fact that our knowledge of this subject has increased tremendously during the past decade. This subject should receive more consideration from ophthalmologists than it does, in order to classify the etiology, symptomatology, diagnosis, prognosis and treatment, even though we are dependent upon physiologists, physiologic chemists and other laboratory experts for our basic knowledge.

The literature of the past 10 years contains many valuable articles upon this subject and the author has reviewed many of these, especially those appearing in ophthalmic journals. Notable among these, during the past year,

are those by Lamb, Lisser, Schirmer and Zentmayer. However, to give all due place would make a book, even upon the hypophysis alone. It is needless to state that in the brief time allowed me such a discussion is impossible.

If we could be sure in any given case, from the eye symptoms alone, or even from the general symptoms, that we were dealing with hyper- or hyposcretion from this or that ductless gland, singly and unmodified by other glands, the problem would be greatly simplified. Fortunately or unfortunately, as the case may be, nature does not, as a rule, prescribe such an easy task, because overabundance of secretion from one gland is apt to be followed by the same condition in another gland as Lamb and others have mentioned. The result is stimulation of the sympathetic nervous system, especially in the incipient stage of hypersecretion from

the thyroid and later stimulation of the autonomic or vagotonic system from the thymus and posterior pituitary.

In as much as many of these cases consult an oculist first, either because of headache or predominating eye symptoms in the early stage of their glandular disease, it behooves us to be on the alert and to remember, as Grünwald has so tersely stated, that "we are physicians first and specialists second."

#### THYROID.

The sympathetic system is stimulated by secretion from the thyroid, circulating in the blood and lymph. In cases of slight hypersecretion from this gland, in which the secretion is not reinforced or antagonized, we see a transitory dilation of the pupils combined with slight widening of the palpebral aperture. This early in the disease we might not suspect the thyroid; but we should especially in women whom we are inclined to designate as neurotic. According to Noyes and many others, goiter occurs with much greater frequency in women. If this stimulation is continued over a long enough period of time, Kocher's or Rosenbach's (Hoeman's) or even Stelwag's signs appear. As the disease becomes more definitely established, Gifford's and von Graefe's signs appear, leading ultimately to the clinical entity known as Grave's or Basedow's disease. By the time exophthalmic goiter is well established, there is hypersecretion from the adrenals as well. In fact, at this stage of the disease the symptoms are produced by secretions from several of the ductless glands. For instance, if the blood contains secretions from the thymus or posterior pituitary, the pupils will be smaller than in the early stage of thyroid hypersecretion.

The following are the commonly recognized signs and symptoms of exophthalmic goitre:

1. Knies' sign is manifested by dilated and often unequal pupils. However, there is retained reflex activity. This is due to stimulation of the sympathetics and is so often present in the early stage of goiter. According to Lamb there may be associated with

this a low grade chorioretinitis of the macula, and ciliary congestion. He believes this is worse in the eye with the more widely dilated pupil.

2. Von Graefe's sign, which consists in lagging of the upper lid in looking down.

3. Gifford's sign evidenced by difficulty in everting the upper lid. This is due to retraction and rigidity and often occurs early in the disease.

4. Dalrymple's retraction of the upper lid with widening of the palpebral aperture.

5. Mueller's sign, which is the same as Dalrymple's except that he includes the lower lid.

6. Next comes Höman's or Rosenbach's sign of tremor of the upper lid.

7. Stelwag's diminished frequency of winking often followed by a rapid succession of winks or a long interval without winking.

8. Retraction of the upper lid while an object is being fixed is Kocher's sign.

9. Joffroy's is present upon failure of the forehead to wrinkle, when the head is lowered and the patient looks up.

10. Aschner found that the pulse can be made slower by pressure upon the eyeball.

11. Loewe believes that adrenalin dilates the pupil in such cases.

12. Berger has called attention to lacrimation as an early symptom of Graves' disease. He believes this is due to stimulation of the sympathetic. Schmidt-Rimpler, on the other hand, believes this is due to irritation of the conjunctiva, as a result of the exophthalmos.

13. Jellinek and Rosin have noted the early pigmentation of the lids which later disappears.

14. Sattler and Gifford have each mentioned a solid-looking thickening immediately beneath the eyebrow and the latter author states this is found early and without marked exophthalmos.

15. Möbius noted a deficiency in, or even a complete loss of convergence power.

16. Sattler has attributed the occasional falling of the eye lashes and eyebrows to trophic disturbance.

17. Becker found spontaneous arterial pulsation of the retinal arteries in six cases out of seven of this disease.

18. As a new ocular symptom of exophthalmic goitre Suker has described a "deficient complementary fixation in lateral eye rotation" as follows: "After extreme lateral rotation of the eyes to either side with the head fixed and with fixation of an object at this point maintained for a second or two, on attempting to follow this fixation point as it is rapidly swung into the median line, one of the eyes—it may be either—fails to follow the other in a complementary manner into proper convergence and from this point when it is brought into the median plane. Either the right or left eye makes a sudden rotation into the fixation with its fellow, but before it does so, an apparent divergent strabismus is manifested. According to Suker, it is no doubt due to a dissociation in the functions of the sympathetic and the extraocular motor nerves of the eye, and perhaps also to exhaustion on extreme lateral rotation of the eyes."

19. Ocular bruit has often been mentioned as a symptom and has been discussed at great length many times.

20. A very infrequent symptom is ocular nystagmus.

#### PARATHYROIDS.

Insufficiency of the parathyroid glands may be responsible for zonular cataract and for eclampsia, convulsions of childhood and epilepsy. Tetany may also occur.

#### PINEAL GLAND.

The secretion, if there is any, from the pineal gland does not seem to have any effect upon the eye. It is possible to explain all of the eye symptoms present, when there is hyperplasia of this gland, upon the basis of pressure and it is reasonable to assume that this is the only way in which eye symptoms are produced.

However, Oppenheim believes that the symptoms from this gland are similar to those from tumors of the corpora quadrigemina. With disease of the

pineal, the third, fourth and fifth nerves are not involved so often as when the corpora quadrigemina are diseased, but nystagmus is more often present. Frankl-Hochwart has expressed the opinion that tumor of the pineal body is responsible for unusual height, obesity, drowsiness, excessive growth of hair and a premature genital and sexual development associated with precocity of adolescence.

#### THYMUS.

In marked contrast with stimulation of the sympathetic by thyroid hypersecretion is stimulation of the vagotonic or autonomic system by hypersecretion from the thymus. Under such circumstances we find contracted pupils, narrow palpebral apertures, esophoria, spasm of accommodation, deep ciliary congestion and chorioretinal and scleral disturbances of circulation.

Persistent hyperplasia of the thymus was found by Garre in 95 per cent of fatal cases of exophthalmic goiter. Von Haberer obtained remarkable improvement, in a patient whose condition was very serious following a thyroid operation, by removing part of the thymus. According to Halstead's recorded cases, thymus feeding, radium and Roentgen-ray treatment improved remarkably patients who had not been benefited by thyroidectomy and ligation of the thyroid arteries for exophthalmic goiter.

Lamb states that "the more chronic inflammations may usually arise in conjunction with vagotonia, but such a condition as simple glaucoma is probably the end result of gonadal and adrenal insufficiency. Whereas acute inflammatory glaucoma is probably the result of a sudden imperative demand upon the adrenals for secretion to sustain the body in its attempt to defend itself against shock, fear, etc., in the presence of gonadal and adrenal insufficiency; for, although the secretion is forthcoming for a short period, the inability to continue to supply it causes a precipitate lowering of sympathetic tone and throws the balance under the control of the vagus. This, of course, in the presence of predisposing factors,



such as high hyperopic eyeballs and other anatomic abnormalities."

"This idea of the etiology is substantiated by the fact that pilocarpin and adrenalin, by hypodermic injection, overcome the attack; and, furthermore, stimulation to the sympathetic is well known to be always beneficial."

Bruner had his suspicions aroused concerning the pituitary in a patient requiring a frequent change of lenses, with the result that an early diagnosis was made and an early operation resorted to with a good result.

#### ADRENALS.

It is now, I believe, a well recognized fact that hypersecretion from the adrenals stimulates all the other ductless glands as well as the sympathetic system. Hypodermic injection of adrenalin seems to have the same effect as stimulation of the sympathetic nerve endings over the entire body. Adrenalin also produces contraction of the pigment cells in the skin, and probably in the retina of the frog, just as stimulation of the sympathetic does. However, the pituitary secretion seems to have a direct effect upon the blood vessels and not upon the sympathetics.

#### PITUITARY.

Bitemporal hemianopsia is present as a late symptom in hyperplasia of the hypophysis in about 40 per cent of the cases, but is a symptom for which we should not wait before making a diagnosis. The fields, according to Cushing, may early show a slight contraction from pressure of the pituitary upon the chiasm, and homonymous hemianopsia is by no means uncommon. In the absence of acromegaly, Uhthoff believes homonymous hemianopsia is very rare. Other authors have reported superior temporal slant of the peripheral field, scotomas and hemichromatopsia. Cushing ranks the ocular signs and symptoms as the most serious disturbance of the disease, and these are not always in proportion or direct relation to the enlargement of the sella turcica.

Neuroretinitis and optic atrophy are almost always late symptoms of the disease, although the former may occur

quite early. Paralysis of the third nerve occurred in 15 per cent of the cases tabulated by Uhthoff. G. E. de Schweinitz has called attention to "antecedent amblyopia" as a very early and probably not a constant symptom of disease of the pituitary. This precedes other demonstrable ocular signs and symptoms.

One of the very best articles I have found on the ductless glands from the internist's viewpoint is by Dr. George Dock, of St. Louis, and appears in Osler's *Modern Medicine*, 1909, part 2, under the title "Diseases of the Ductless Glands." He gives due importance and place to the ocular symptoms.

Ott and Scott state that the secretion from various ductless glands produces hypersecretion of adrenalin into the blood, i. e., the thymus, thyroid, parathyroid, pancreas, pituitary, testicle and ovary have this effect. The reverse is equally true. Lisser and many others have emphasized the fact that very rarely do we see the result of disturbed or altered secretion in only one gland.

#### CASES.

The three following cases may be of interest:

1. Mr. G. W. M., age 44, banker, first consulted me February 21, 1912. He stated that at 9 years of age he lost his right eye from an injury, but that it was not removed until three years ago, in Iowa, because of sympathetic ophthalmia in the other eye. Recently, his vision has been failing, so that it was reduced to 15/20, and J. No. 2.

The patient is unusually fleshy; his face "looks flabby"; his lids droop, are edematous and the edges hyperemic; the eyelashes and eyebrows are brittle. Cerebration is quite slow. In fact, he states it is quite difficult to think.

Examination of the anterior segment of the left eye revealed a slight pericorneal injection of the scleral vessels; the cornea, iris and aqueous were hazy; there were a few posterior synechia, and very fine deposits on Descemet's membrane.

The fundus was negative except the disc looked quite pale even through hazy media, and there were a few fine

dust-like opacities in the anterior portion of the vitreous.

The field was concentrically contracted for colors, although the form field was negative, but there was no evidence of temporal hemianopsia.

The diagnosis of serous iridocyclitis associated with hypothyroidism must be evident from the symptomatology. Dionin and atropin were used locally and thyroid extract internally; the latter was prescribed by his family physician. He improved slowly but steadily under this treatment with a return of good vision and good general health.

As I see this case now, I believe the hypophysis, as well as the thyroid, was diseased. But, without an X-ray of the sella turcica, positive conclusions are less certain, although an X-ray examination could, of course, have been negative with disease of the pituitary.

Beck has reported a case in which the hypophysis was found quite large post-mortem, as he expected from his clinical findings, but in some respects the case bears a striking resemblance to those of hypothyroidism, formerly called myxedema.

2. Mrs. V. D., age 32, married, complains of headache, slight nausea and prominence of the eyes for the past year. V. O. U. 15/15-1 and J. No. 1. There was noticeable exophthalmos of O. S. and more of O. D. with increased injection of the ocular and palpebral conjunctival vessels. Von Graefe's, Gifford's, Möbius', Knies' and Stelwags' signs of exophthalmic goiter were present. The fundi were negative.

Under a cycloplegic V. O. D. 15/30 — = 15/10 + 1.00  $\text{C}$  + 0.50 Ax. 95°; V. O. S. 15/30 — = 15/10 + 1.00  $\text{C}$  + 0.50 Ax. 80°. She was given a full correction for constant use.

Organotherapy, prescribed by her family physician, has produced less exophthalmos and an improvement in her general health. As all her symptoms are mild, operation has not been advised.

3. While writing this paper a third patient, Mrs. H. T. T., age 33, married, presented herself for examination with more than a moderate palpable enlargement of both lobes of the thyroid.

She gave the usual history of asthenopia and neurasthenia. Her mother and one sister each have a goiter.

The anterior segment of each eye was normal and V. O. U. 6/6 — and J. No. 1.

Under a cycloplegic V. O. U. 6/7.5 + = 6/4 + 0.50 Sph.

The fundus of each eye showed a low grade chorio-retinitis, which may be due to her hyperthyroidism, as her family physician has failed to find anything else in her general health to account for this. However, this was near the disc on the temporal side and did not involve the macula. In fact, I have not found involvement of the macula often.

There was a slight deficiency of convergence, but with so little hyperopia I advised against the wearing of lenses. She had been treated systematically by organotherapy without improvement, and, as two competent general surgeons had advised an operation for goiter, I concurred with their opinion.

In conclusion, kindly permit me to emphasize the importance of the low grade chorio-retinal changes is exophthalmic goitre or thyroid hypersecretion, as I believe these are too often overlooked. Too many observers probably expect to find grosser lesions. These changes may be due to the fact that too much light is permitted to reach the macula, as Lamb states he finds these more marked in the eye with the more widely dilated pupil; but I believe it is just as reasonable to assume that the stimulation of the sympathetic is the cause. Perhaps it is both.

We, in Colorado, should have a better opportunity to study this, on account of our excessive light, than our more distant confreres, if the former assumption is correct. If the latter is true, the increased pigmentation of the lids, which occurs early, may occur simultaneously with the chorio-retinitis.

#### DISCUSSION.

Henry Sewall, Denver, Colo., stated there appears to be no important specific action of any internal secretion on the eye, in the sense that atropin is a mydriatic or eserine a miotic. But as the eye is a tissue



complex in physiologic relation with all the rest of the body, internal secretions operate on its tissues as they do on similar elements throughout the organism; and as a part of the organic whole the eye must be affected in its functions and nutrition by what goes on elsewhere.

I will therefore devote the few minutes allotted to me to a consideration of some of the general physiologic relations of the internal secretions. We find here, as in so many other fields, evidence that there is no such thing as narrow specialism in ophthalmology, but that the well equipped eye doctor belongs to that group which "knows everything about something and something about everything."

It cannot but be useful for us to evaluate the position of these mysterious ductless glands in the economy. I well remember the day of relative positivism in physiology; when the mechanism of the reflex arc was the key to all nervous activity; when the combustion in the calorimeter seemed to be the last word in the explanation of protoplasmic energy; when nutrition concerned only the metabolism of compounds of carbon with a little sulphur and phosphorus salts and water, and there were no vitamins. I remember that when Brown-Séquard announced the vivifying effects from the injection of testicular juice he well nigh shattered a hard earned reputation as a safe and accurate physiologist.

Now we are ready to believe that if the external secretions prepare the food for the metabolic activity of the cells, the internal secretions prepare the cells not only for metabolism of the food but for all their recondite physiologic relations.

For long years the lecturer on physiology had been introducing the unicellular ameba as an integration of all physiologic functions; and then he proceeded to show how, with the differentiation of tissues in the multicellular animal, there was a physiologic division of labor so that in the higher forms of life autonomous mechanisms were coordinated only through the fixed channels of nervous impulses.

It seems to me it was an advance comparable in importance with Harvey's discovery when in 1902 Bayliss and Starling showed that an acid extract of the duodenal or jejunal mucous membrane, when injected into the blood of an animal, caused its pancreas to secrete. They proved that the active principle, which they named "secretin," resided in the intestinal epithelium in an inactive condition (prosecretin); that wetting of the mucous membrane with dilute HCl, or the acid chyme, activated the prosecretin into secretin; that this product is soluble and is not discharged into the intestine but into the blood; and that the blood so charged, reaching the pancreas, causes this organ to secrete. Furthermore, it was found that secretin retains its properties after boiling. It is not an enzyme.

Starling looked on it as a type of specific substances which, procured in one organ, reached another through the circulation and made the latter act; and he gave to this type of compound the name "hormon," from the Greek word meaning "to excite."

Every organ of internal secretion undoubtedly gives off an analogous chemical body. In the case of the adrenals the active principle has been shown to have a definite chemical formula, to submit to crystallization, and the same has recently proved by Kendall for a product of the thyroid gland, and by Robertson for his tethelin extracted from the hypophysis.

An illuminating discussion of the vital relations of the whole group of internal secretions, under the title of "Hormonic Equilibrium" was one of the evidences of great capabilities given by the late Henry S. Denison, who was cut off at the beginning of a most promising career some three years ago.

It is not too much to say that, though our knowledge of internal secretions and of the class of reactions which they set up is certainly but a small fraction of the truth, we must conclude that, directly or indirectly, internal secretions are involved in every vital act of protoplasm, and Cannon has shown that they must be considered as a physical basis of emotions if not of all physiologic activity.

It is universally admitted that each gland of internal secretion produces a definite chemical product which enters the circulation and modifies the action of various cells in specific fashion. There are two ways in which modification of this secretory function may bring the ductless glands within the view of the pathologist and clinician, first through hypersecretion, second through hyosecretion. Both may be equally disastrous, and each adds to its own pathologic changes. But there is a respectable opinion that ductless glandular disorder is not simply quantitative in its influence, but may be essentially qualitative. That is, that there is a perversion in the chemistry of the glandular secretion, which deprives it of useful function and makes it distinctly poisonous to the body in any concentration.

There is a fourth view of the origin of dyscrasias dependent upon glandular disorder aside from the secretory function. There is reason to believe, namely, that the ductless glands are specifically detoxicating organs necessary to the neutralization or destruction of poisonous matters added to the circulation as the result of normal cellular metabolism or of the intestinal absorption. It is worth while to touch upon the evidence from this point of view. Thus, it has been found that when an animal is thrown into tetany through removal of its parathyroids, the tetany is relieved by bleeding the animal and injecting salt solution. Presumptively, this treatment removes from the circulation certain poisonous matters

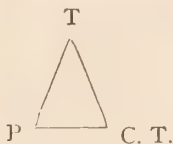


which it was the function of the parathyroids to destroy.

Still stronger evidence has been furnished for a detoxicating function of the adrenal capsules. When the suprarenal bodies are removed from a frog the effect is finally fatal. If, while still moribund, the frog is bled and its blood is injected into a normal frog, no ill effect is witnessed. But if the injection is made into a recently decapsulated frog, the latter suffers a rapid paralysis and death. Moreover, if this poisonous blood is injected under the skin of a normal frog in which a ligature has been previously thrown about one thigh, cutting off its circulation but not including the nerve trunk, after three hours the muscles of the ligatured leg contract normally when their nerve (omitted from the ligature) is stimulated; while stimulation of the nerve of the opposite leg, where the tissues have been bathed in the poisonous blood, produces no effect, though the muscles contract when directly irritated. The obvious conclusion is that the blood of a frog from extirpation of the suprarenal bodies contains substances which paralyze the end plates of the motor nerves somewhat as does curare.

Unfortunately for our therapeutic endeavors, the matter is still more complicated than has been represented. The investigations of Falta and others indicate that there is no such thing as the isolated action of a single ductless organ; that all the glands of internal secretion are mutually engaged in maintaining a normal biologic equilibrium and that necessarily there must be a readjustment in toto when the action of one is modified in order to preserve what we call health. A great service has been rendered by Falta and his colleagues in showing that there are natural mutual exciting and inhibitory relations between at least certain of the ductless glands. Thus the thyroid and the chromaffin tissues are mutually stimulating while the insular apparatus of the pancreas tends to inhibit both.

These relations may be represented by a triangle, the three angles representing the pancreas thyroid, and the chromaffin tissue:



The internal secretion of the pancreas tends to inhibit the effects excited by activity of either thyroid body or chromaffin tissue (most abundantly localized in the adrenal medulla) while the secretions of both the latter organs mutually stimulate their tissues of origin, or at least magnify their effects.

Finally, it may be said that a welcome and hopeful element of exactness has ac-

crued from researches in this field. It is generally granted that adrenalin or epinephrin, the active principle of the adrenal medulla, is a specific stimulant for the receptive substance at the peripheral termination of the sympathetic nerves, and that its pharmacologic effect, whether of excitation or inhibition, depends upon the corresponding function of the nerve involved. Contrariwise an interesting analogy is furnished by the discovery of Langley that nicotine is equally selective of the receptive substance mediating between the sympathetic filaments and the ganglion cells of the peripheral ganglia interposed in the paths of the centrifugal fibres.

I have tried to show that whatever facts of mechanics postulate a relation between any of the ductless glands or their secretions and the eye it is true to a peculiar degree that comprehension of any local reaction to the internal secretions must be founded on an apprehension of their general relations.

Edward Jackson, Denver, Colorado, thought that, with reference to exophthalmic goiter, the older observation of the influence on the sympathetic nervous system had been considerably overworked. Manifestations of nerve action in connection with the cranial nerves, observed in relation with the eye, seemed to have certain characters in common. They seemed to be all largely disturbances of coordination. At least we might group them in that way. The failure to wink is a failure of reaction to normal stimuli. The failure of the eyelid to follow the eyeball as the eye turned down (the Graefe sign), the failure of elevation of the eyebrow, all these things seemed to represent a failure of coordination of action on the part of the central nervous system, and probably of the cerebrospinal nervous system instead of the sympathetic. This suggestion might prove more fertile in the minds of those who, like Dr. Sewall, were studying the physiology, than in the minds of those who were concerned strictly with the eye.

M. Jean Gale, Denver, Colorado. I saw a case of exophthalmic goiter yesterday. With all the symptoms of exophthalmic goiter there were also marked choreic movements.

Harold Gifford, Omaha, Nebraska, said that with regard to the connection between the emotions and the secretion of the adrenals, he had had a curious corroboration in his own person. For some years, when he had become very much excited he had experienced a decided and depressing pain in the lumbar region, lasting about five minutes. Dr. Jackson's remarks on the lack of coordination seemed to him to be well worth considering. But it may be questioned whether some other explanation does not more accurately fit some of these symptoms. For example, the symptoms known as Dalrymple's, as well as several others, all

might be explained as due to overstimulation of the sympathetic. With regard to the connection between chorea and hyperthyroidism, there is another explanation. Every now and then a case of hyperthyroidism is cured by removal of the tonsils, and this suggests that both the chorea and the hyper-

thyroidism may have been due to tonsil infection.

F. R. Spencer (closing). I believe we should change our terminology a little and speak of exophthalmic goiter as hyperthyroidism, contrasting this with hypothyroidism.

## RELATION OF RETINITIS PIGMENTOSA AND ALLIED CONDITIONS TO THE DUCTLESS GLANDS.

E. L. JONES, M. D.

CUMBERLAND, MD.

This paper reporting a series of cases of retinitis pigmentosa treated by thyroid extract was read before the American Academy of Ophthalmology and Oto-Laryngology, October 30, 1917.

Some time in the year 1910 there came to me, for considerably impaired vision in both eyes not helped by glasses, a mulatto girl, 15 years of age. Ophthalmoscopic examination showed black spider splotches on the dark fundus natural to the negro; not readily visible at first inspection, and being the only case of retinitis pigmentosa I have seen in the colored race. Being mindful of the futility of treatment for this disease, as far as text-books and literature went, it occurred to me to strike out in some other direction; and as thyroid extract had been proven in late years to have so marked an influence on retarded mentality in certain states, as cretinism, and a mysterious influence over constructive metabolism, this was the agent selected. This view was further strengthened by the close relation of the optic nerve to the brain, giving rise to the expression that "The optic nerve is the finger of the brain." Unfortunately, this case could not be followed up, as the patient removed shortly afterward to Baltimore, and could not be traced.

The earliest case of which a record could be made is the following: C. E. J., male, aet. 42, August 16, 1910. Sight known to be failing for several years, with both temporal fields moderately contracted, and partial night-blindness. R. V.=18/60, Jaeger No. 10. L. V.=18/50, Jaeger No. 10 +.

No improvement by glasses, far or near. Pupils medium size, not reacting to light, but doing so on convergence. Marked retinitis pigmentosa, both eyes. Put on thyroid extract, one grain three times a day. Took one bottle of tablets, probably one hundred. As this patient did not return, a letter of inquiry was sent, to which he replied on February 5, 1912, sending samples of fine print for close, about Jaeger No. 7 for each eye, and 20/80 + for distance. He was located and induced to return on July 29, 1916; pupils slight movement to light, dilate slowly in dark. R. V.=20/40. L. V.=20/50. Each with Sph. + 4 Jaeger No. 3; together Jaeger No. 2 easily. Fields almost full, except temporal ends. Fundus the same, highly pigmented. Put back on one grain thyroid three times a day, to which was added 1/60 grain strychnia and 1/30 grain arsenic. The arsenic was added from a belief in its alterative value, and the strychnia as a bitter tonic, only indirectly beneficial to build up lowered nerve tone. This formula has been in use for several years past, as will be seen in later cases. He was induced to return on August 19, 1917, having taken four boxes of sixty pills each. R. V.=20/40 - Sph. + 4. = Jaeger 1 -. L. V. 20/50 Sph. + 4. = Jaeger 1. Both eyes open V.=20/40. Pupils fixed; fields probably a little more con-

tracted at temporal sides. The notable feature is that the downward tendency of the disease, as far as this single case is concerned, was checked by the first treatment, covering only one month.

Case II. Mrs. S. E. R., aet. 50, came shortly after the previous case, complaining she could not see to read with any glasses, which fact was verified by tests. A record made at the time, and checked off on one or two return visits, was hopelessly misplaced, but fixed sufficiently in memory to be sure she could not read a newspaper with either eye, and in all respects had a fully typical retinitis pigmentosa, with night blindness. She was put on thyroid alone, and by request returned on June 3, 1917, volunteering the statement she knew her sight was better. Best attainable vision R. 20/75 Jaeger 4—. L. 20/50 Jaeger 2. She has taken the tablets on frequent occasions during these years.

Case III. D. H. W., aet. 44, August 18, 1910. This case is reported by reason of being an uncle of Case IV, and probably indicating the course of the disease in this particular family. Noticed first failing of sight, twenty years ago, for night only. Seen by me in 1906, with clear diagnosis of retinitis pigmentosa. Previous to this, he had been under the care of one of Philadelphia's leading oculists, receiving strychnin injections and electric treatment. In 1906, V. = 20/50 each eye, Jaeger 3. Seen in 1908 with rupture of cornea of left eye and traumatic cataract. R. V. = 20/80. Sph. + 3. Jaeger 6—. Fields much smaller. Pupils dilate very slowly in the dark. Some parts of fundus entirely black. As an experiment he was put on two grains thyroid t. i. d.

February 7, 1911. V. = 18/120 Sph. + 3. Jaeger 12. Fields more contracted. Beginning cataract. Gave trial injection of cyanid of mercury with dionin subconjunctivally.

September 23, 1912, V. = 9/200. Jaeger 14. I think, and he believes, it is the cataract more than the retinal disease reducing vision. Put back on thyroids with arsenic in increasing doses, which he took until the heart was upset

by the thyroid, and the stomach by the arsenic.

August 21, 1917, returned by request. Barely counts fingers. Pupil almost opaque. Light fields as large as five years ago. In view of the formation of the cataract, which seems sclerosed and permits a little light to pass through by electric ophthalmoscope, it is not possible to draw any conclusion as to what the sight would be had no cataract formed.

Case IV. B. F. W. Aged 28. September 15, 1915. Nephew of Case III. Night blindness since eight years old. Had been educated as a pharmacist, and had secured a position in Philadelphia, where he took treatment from the oculist who treated his uncle. Realizing the gravity of his condition, he decided to give up his profession and return to rural life near his small home town. He has distant atrophy of retina and optic nerve, contracted retinal vessels, and very fine pigmentation, visible only by direct examination as fuzzy, chopped up hair all over fundus. V. each varies to 20/50 +, and Jaeger 3 to Jaeger 1. Fields contracted to a five-inch circle at twenty inches, with an acute indentation, fingerlike, on temporal sides.

Sept., 1915, put on two grains thyroid, and increasing doses Fowler's sol. of arsenic, three times a day. Feb. 22, 1916, R. V. = 20/40, Jaeger 2 +. L. V. = 20/40, Jaeger 1, clearer. Add strychnia and arsenic to thyroids in pill form. Tests made on Nov. 16, 1916, Jan. 31, 1917, and Aug. 27, 1917, all about the same. Fields are as large as at beginning. Pupils do not react visibly, but on remaining in the dark quite a while, they enlarge as though a weak mydriatic had been used, and are correspondingly slow in returning in bright light. V. each eye 20/40 readily, with some of 20/30, and Jaeger 1 easily, each. The value of a slight raise in these cases is in showing arrest of downward tendency of disease.

Case V. C. H. Aged 10. May 17, 1913. Convergent strabismus right eye; very poor use of the left. Skull lopsided, teeth terraced on front, no enamel on tips. R. V. = fingers four feet;



no Jaeger. L. V. = 18/160, Jaeger 6-8. Dilated pupils. By shadow test both eyes hyperopia 7D. Optic discs fibrous, retinal vessels white streaks with red centers; entire fundus studded with black spots like pepper, coarse and fine, thickest at periphery, and more black than red area. Sight worse in fading light; fields good. Pulse 60. Blood pressure 85-90. Put on one grain of thyroid t. i. d. on alternate weeks.

December 23, 1913. Pulse 100. Blood pressure 85. V. = 20/100 +, Jaeger 4-3. Gets on in school better. In this case, the improvement in vision may be due to wearing the glasses. Returned by request on:

September 17, 1916. Took tablets only in 1913; L. V. = 20/75 +, Jaeger 3. Pulse 60. Blood pressure 92. Pupils active. Put on prescription: strychnin 1/100, arsenic 1/50, thyroid 1 grain t. i. d.

September 23, 1917, V. = 20/50 +, Jaeger 1 -. Retinal vessels at disc barely colored, soon becoming white threads. Choroidal vessels visible where pigment is not massed. Family history indicates hereditary specific infection. Sees better than formerly by dim lights.

Case VI. Mrs. S. Aged 50. May 18, 1916. Came to get "good specs," so she could see; would not be convinced it was a case of bad eyes, although her father had been blind many years, and several of his relatives blind or near-blind, some of them presumably from the same disease. Noticed night blindness before twenty years of age. Retinitis pigmentosa, both eyes of extreme degree. Pupils inactive to light and convergence. V. each 20/75 - sph. + 4, Jaeger 3 each. Fields in circle of one foot diameter, one and a half foot removed. Put on strychnia 1/60, arsenic 1/30, and thyroid 1 grain three times daily.

July 18, 1916. Has taken the above irregularly. Barely visible motion of pupils to light, readily so to convergence. V. each 20/50, S + 4.0, Jaeger 2-.

September 18, 1916. Has been taking irregularly. V. each = 20/50 S + 4.0, Jaeger 3 each. Jaeger 2 jointly. Pu-

pils dilate slowly in dark room, but not to quick exposure. Patient could not be induced to return any more, but showed demonstrable improvement in the four months of observation.

The next two cases are introduced to support the thyroid and hypophyseal implication in the origin of the disease, being sisters in a family of five children, one of whom, a boy, died at about eighteen years of age, having the same degree of night blindness and overgrowth of body in general as the sisters reported. The other two children were each seen, and had normal eyes and bodies. The mother has a large goiter, which was present during all her child-bearing life, and likely deficient in providing its proper amount of internal secretion during the gestation of these children. The skeletal disproportion, and extreme adiposity, with abundance of hair on the head, fit fairly the description given by Cushing of dyspituitarism.

Case VII. L. C. Aged 14. July 29, 1905. Alternating divergent strabismus as long as can remember. Absolutely blind when darkness approaches. Enormous weight. V. each eye = 18/120 +, Jaeger 7 poorly. Wearing sph. + 2. Visual fields much contracted. Pupils normal. Cyl. + 2, ax. 90°, each, called for. This does not raise V., but dulls badly by reversal of axis. Both eyes disseminated spiders of black pigment, with splotches on retina, up to region of macula, typical retinitis pigmentosa. Gave cylinders, and put on long course of small doses of arsenic and nitroglycerine; the first because of its supposed effect on metabolism, and the latter that it might theoretically cause increased waves of arterial blood supply for a short while after each taking.

Next seen August 14, 1911. Fields and appearance no worse. Has seven-year old sister weighing one hundred pounds, with night-blindness. Renew arsenic and trinitrin. Patient's mother had goiter since eighteen years of age.

Next seen November 11, 1916. Has been having severe scalp trouble, with bald spot on head. Walks like semi-blind person. Pupils active. V. = 20/

100 + each, Jaeger 3 readily. Optic disks very white, retinal vessels small. Less pigment, especially near disc than record would lead me to expect. Visual fields not over 8 inches in diameter at one and a half feet.

Mother replies to question as to menstruation, that she misses as much as three years; that she took the treatment prescribed on each of the former occasions, about six months. Put her on the strychnia, arsenic and thyroid pills.

August 13, 1917. V. each 20/75 —, Jaeger 2 +. Slight pigmentation in the right, more in left retina. Optic nerves atrophic. From misunderstanding of instructions, left off treatment when overstimulation symptoms appeared, and did not resume. Gave prescription for one grain each of thyroid and pituitary.

Case VIII. V. E. Aged 12. November 11, 1916. Sister to above patient. Enormous overgrowth of body, massive, expressionless countenance, luxuriant, long, silky hair. Night-blindness complete, even with full moon. Contracted visual fields, poor control or sense of direction of eyes, low ability to observe, keen memory. Pupils small and act to light. V = each 7/150, Jaeger 3. Sph. 3.0 each 20/100 +. With dilated pupils it was hard to make a critical inspection of the fundus, as eyes wandered in all directions. But the fundus was dark, with no red; disks pale, vessels small. Put on half adult dose of arsenic, strychnia, and thyroid.

August 13, 1917. Took above only a few weeks, from misunderstanding of directions. Fundus slate color; optic disks and vessels atrophic. V. each eye 20/75 — R. Jaeger 1, L. Jaeger 2. Prescribed thyroid with pituitary.

It was deemed worth while to try the thyroids on cases of atrophy other than retinitis pigmentosa, in certain cases of congenital atrophy of children, with low vision and pallid nerves. But none have been followed on which to report reliably, as they could not be induced to persist in treatment, or return for observation. For instance, about twelve years ago, a boy had his

left eye ruptured, and examination at the time showed congenital atrophy of right optic nerve with V. = 20/60 —, at which point it stood unchanged, as opportunity to examine it recurred many times. In February, 1917, he felt need of visual help, and was put on the arsenic, strychnia, and thyroid, but shortly after removed to New Mexico. In reply to a letter of inquiry in September, 1917, he sends clipping marked for 20 feet, which, when compared with test chart, seems to about equal the 25 feet line, and print the size of Jaeger 1 read at ten inches, but as he was not tested by standard letters, the result is dubious. He took only a month's treatment.

Case IX. On August 8, 1914, H. D., aged 18, came for dullness of sight and hearing. He was mentally defective to the extent that he could not be trusted to travel alone, and also in other evident respects. He had rapid nystagmus in both eyes, with V. 20/75 —, Jaeger 3, and 20/40 +, Jaeger 2, right and left respectively, not raised by glasses. No encouragement was offered as to helping the vision or nystagmus, but his mother was advised to put him on thyroids, a good portion of the time for two years, on the expectation of improving his mentality. By request, he returned August 9, 1917; general improvement in facial expression and manner were evident at a glance, and corroborated by his conversation. V. R. 20/50 +, Jaeger 3 +, V. L. 20/40 +, Jaeger 1 —, and the nystagmus was so infrequent as to hardly attract notice.

The following were observed long enough to report upon:

Case X. S. McD. Aged 64. September 26, 1912. R. eye blinded by iritis fifteen or more years, pupil occluded. No perception of light. L. severely damaged eight years ago by iritis, pupil nearly occluded, which conditions were incidentally observed several years ago, when he came in company of a brother who had an acute iritis in one eye, he being used as a text to illustrate what harm iritis could do, when not treated. L. fundus could be seen, the choroid being atrophic, but not destroyed. He



had been told when seen on trip several years before, that nothing could be done, so the purpose of this trip was to see about a deafness, which tuning fork tests showed to be in the nervous apparatus of the ear.

He was put on mercury with chalk, strychnia, Dover's powder, and thio-sinamin pills, and returned on November 30, 1912. Following this, pupil was visibly contractile, V. = 6/200 with strong — sph., Jaeger 14. The choroid had the color and appearance of grained oak, no red being visible, and optic disc a mere splotch, with vessels hardly visible, and soon vanishing. It was suggested he try thyroid, and he was given 2 grain tablets, three times a day. February 25, 1913, V. sph. — 6 = 18/200 — 2 Jaeger 8 partly. August 8, 1913, S — 6.0 V. = 20/100. S. + 3.0, Jaeger 2 —. December 1, 1916, V. about same, with partially intoxicated patient.

Case XI. M. McD. Aged 60. March 21, 1913. Brother to Case X. Made one visit several years previously for acute iritis of two or more weeks duration in one eye; other normal. R. pupil fairly large, no reflex to light. V. = fingers one foot; only seen in outer field. General atrophy of choroid, red lining being substituted by fibrous-looking tissue with symmetric splotches, containing black spots, comparable to "dog tracks," and some tal-lowy flakes. L. pupil sluggish to light; V. fields full; fingers six feet. Choroid atrophied, with red bands in it. Pigment massing small. Pulse 70. Blood pressure 205. Put on thyroid tablets, 2 grains each. T. i. d., subject to heart action. Seen in 1914, L. V. = 20/100. July 8, 1916, L. V. = 20/75, Jaeger 6, with 5.0 D. Sph. Field full. Splotches in L. around macula area, worse than in R. Renew thyroid, with strychnia, arsenic, and iron. This patient was never seen again, but brother reported the pills excited his heart so that he gave them to said brother to take.

Case XII. H. D. Aged 69. May 17, 1916. V. each 20/75 S. + 4.0, Jaeger 4 each. R. pupil enlarged and sluggish, except to reflex action. O. D.'s atrophic both eyes. R. field contracted.

Tension up, each eye. Blood pressure 136. Prescription, strychnia, arsenic, and thyroids.

June 19, 1916, R. V. = 20/50, Jaeger 3. L. V. = 20/75 — Jaeger 4 +. August 18, 1916, pupils both eyes active. R. V. = 20/40. S + 4.0 Jaeger 2. L. V. 20/75 + Jaeger 6. Fatigues quickly.

October 18, 1916. Pupils small and active to light. V. as before. December 19, 1916, V. as before, with same Jaeger 1. Pupils small, with normal reactions.

April 20, 1917, R. V. = 20/40 S + 4.0 Jaeger 2 +. L. V. = 20/75 Jaeger 6. July 1, 1917, pupils normal size, R. immobile, but slowly dilates in dark. L. active. V. as previous test.

It will be observed the right greatly improved, and the left ceased to get worse. This patient, as also Case IX, was quite dull of hearing, and tuning fork tests showed nerve impairment. Improvement in both cases in the hearing was marked, it requiring no more effort to converse at ten feet on the later visits than it did for three or four at the beginning. It looks reasonable that whatever would improve the tone of the optic nerve, would do the same for the auditory. This has been borne out by the result of thyroid treatment in several cases of congenital sluggishness of hearing in children, but not enough to put them in the deaf-mute class. It has also been tried in one case of essential anosmia, in which the sense of smell was greatly increased.

It has always been an unexplained mystery as to why the particular form of optic atrophy manifesting night-blindness would be accompanied by pigmentation of the retina, and likewise why all cases of night-blindness do not have the pigmentation, the "Retinitis Pigmentosa sine Pigmente." In my belief the disease is due to pluri-glandular deficiency of the ductless glands, which may be impaired in varying degrees respectively, and in some instances, either the thyroid, adrenals, or the pituitary continue to functionate sufficiently. Breaking down of the adrenals would explain the pigmentation on the same basis as it explains the dark skin in Addison's disease.



The part played by each of the ductless glands individually cannot be exactly gauged in the present state of ignorance of the ultimate physiology and pathology of said endocrine glands. Dr. Crile in his masterful experimental pathologic, and clinical studies, has gone deepest into the mysteries of life, and its relation to the ductless glands, and the effect of their increased or suppressed secretion on the mental, muscular, and vital organs, of anyone living. His wonderful formulation of these studies in his theory of the "kinetic drive" will be a medical classic for generations to come. He has shown how in the animal kingdom these secretions are augmented in the struggle of combat or flight for life, and how they become exhausted by long continued fright, loss of sleep, and traumatism. He has shown how in the human the distressing emotions of anxiety, fright, flight for life, do the same things; and has demonstrated histologically in animals, and on a soldier of the Belgian Army suffering the privation and terror accompanying the first German drive over that unfortunate country, the structural cellular changes in the brain, adrenals, thyroids, and liver, at first increased fullness and size, followed by shrinkage and diminution.

It is well known that mild stimulation of any organ or function, followed by due rest, is strengthening to said organ; but excessive and long continued overstimulation is followed by exhaustion, either fatal to recovery, or making restoration long delayed. Herein comes from the great experiences of the world war, what to me is the strongest evidence of the dependence of night-blindness on the ductless glands. French, German, and later English statistics show great numbers of night-blindness in the trenches, as compared to the same in times of peace; these reports also come from Asiatics in British service in Egypt.

The Journal of the A. M. A. for September 9, 1916, has the following abstract: "The frequency of hemeralopia extremely low in times of peace (1 in 12,000 in France, according to

Walter) undergoes an augmentation in war time. At Verdun, Dr. Bordier found 8.78 per cent in ocular examinations during the winter of 1914-15. At the same period, there occurred in the German army, a grave epidemic of this condition. More recently, Vejers has observed it in the proportion of 10.2 per cent. This high figure depends on many causes, some peculiar to the present war, which presents conditions different from those which prevailed in the past, such for example, as the higher mean age of the combatants. The hemeralopia in this war differs from cases which have been described in previous wars in two respects. In the first place, there has been no epidemic, and the revictualing of the army being satisfactory, there have been no crises of hemeralopia due to privation and physiologic misery. By reason of selection, symptomatic hemeralopia is rarely found more in military than in civil life. In most cases, it seems related to some vice of refraction, and principally to myopia. The condition has been observed among volunteers in the early months of the war, among officers of the regular army, and because of these facts and others contained in the report of the commanding officers, and because of the isolated character of each case, it is evident that, in the presence of war, hemeralopia is a symptom rarely invoked by malingerers. Except to those cases traceable to general disease (of liver and kidneys), or to ocular fatigue or disease, there seems to be no satisfactory treatment for the condition.

"With regard to military employment of patients suffering with hemeralopia, . . . it is necessary to point out that the condition appears to be scarcely if at all curable . . ."

This quotation is made for the value of its statistics; also to show that those having this disease were subject to long continued stimulation of watchfulness, loss of sleep, or the emotions accompanying the life or death struggle, which would at first increase the endocrinous secretions, and later exhaust them. Theoretically, at first there

would be an oversharpness of night vision, followed later by its collapse.

In some preliminary remarks on this subject before this society last year, the essayist ventured the prediction that with the rest following peace, these cases would not develop retinitis pigmentosa beyond the normal low rate percentage, but were only functional, and would return to normal. This is borne out by a statement in the *Lancet* in June past; which says that most cases of hemeralopia in soldiers pass off with rest and relief from duty.

The British Journal of Ophthalmology for August, current year, also states night-blindness is common in British and Indian soldiers, but no organic disease is visible. Weekers in Archives d' Ophtalmologie, March-April, 1916, reports night-blindness in ten per cent of examined cases; refraction errors frequent. He attributes it to nerve-shock. Landolt, Paris Ophthalmological Society, reports much night-blindness associated with uncorrected ametropia, which he treats by rest, rich diet, strychnia, arsenic, cod liver oil, iron, potassium iodid. Eason, in the British Journal of Ophthalmology, August, 1917, reports much night-blindness in Cairo and Alexandria, due to simulation, malnutrition, etc. A few cases of real retinitis pigmentosa.

As pointing to the specific disturbance of the adrenals from these war conditions, the following is valuable: Journal of the A. M. A., June 16, 1917, in a review from Russ. Vrach, Petrograd. "Yushtchenko relates that he has encountered a number of cases in soldiers which would have been classed with the traumatic neuroses if it were not for the fact that the men presented certain symptoms, which we are accustomed to encounter with Addison's disease, especially the pronounced bronzing. Analysis of the cases shows further a deficiency in the functioning of both parts of the suprarenals."

Ophthalmic Literature gives the following title: "Fusita—Relation between Adrenals and Retina. Nippon Gank. Zasshi. Sept., 1916." An effort was made, through the courtesy of a friend in the Army Medical School at

Washington, to ascertain the substance of this paper, but the journal was printed in Japanese-Chinese characters, and several Japs turned down the task of translating it.

Another reference of value is from Progrès Médicale, Paris, March 24, No. 12, p. 95; also from abstract in Jour. A. M. A. "Thyroid-Parathyroid Treatment of War Neurosis—Blank comments on the remarkable frequency of abnormal thyroid functioning in the men in active service. He recalls that the thyroid is peculiarly susceptible to emotional stress, overfatigue, and defective hygiene, which readily explains why so many of the troops present evidences of abnormal thyroid and parathyroid functioning. He has found the oculo-cardiac reflex a good index of conditions. With these functional disturbances of the nervous system this reflex is usually exaggerated, indicating vagotony. Under thyroid or parathyroid treatment, or both, this reflex disappears, or becomes inverted as recovery progresses."

The first published reference which came to my notice of giving extracts of the ductless glands in eye disease, was by Dr. S. B. Muncaster, of Washington, in the Ophthalmic Record for July, 1912, in which he advocates a tablet of 1 grain thyroid, 1/60 grain adrenals, and sodium cacodylat 1/200 grain, in retinitis pigmentosa and choroiditis where there are old pigment deposits, at the beneficial effects of which he expresses surprise. Of late some remarkable results are being reported, of pituitary body disease treated by glandular extracts, either by mouth, or by injection of pituitary.

In the Archives of Ophthalmology for March, 1917, are two very elaborate articles on the hypophyseal relation to retinal disease, with treatment by its glandular extract, narrating improvements that would hardly seem credible if emanating from obscure sources. One is by Drs. de Schweinitz and How in Philadelphia; the other is by Drs. Elsberg and Krug in New York. The latter give a reference to the Proc. of Royal Soc. of Med., 1915, v. VIII, No. 3, Sec. on Ophth., p. 32, in which Eason

described a patient who was practically blind, who recovered normal vision and nearly a full field in one eye after thyroid feeding. The improvement had persisted for nine years; the patient had to take small doses of thyroid from time to time, otherwise vision would begin to fail and headaches return. While in New York last June, I had

the opportunity to read Eason's article, which was short, with no theory or explanation as to why thyroid was given, or how it was supposed to act; but as his case was treated in 1907, it is probably the first on record in which this treatment was applied. Let us hope this will not prove a bubble—fair to look upon, but ending in nothing.

## SUCCESSFUL REMOVAL OF A BULLET IMBEDDED IN THE ORBIT TEN YEARS.

OTIS ORENDORFF, M. D.

CANON CITY, COLO.

Report of case read before the Third Colorado Ophthalmological Congress, August 10th, 1917, with discussion, and two illustrations

August 10, 1916. Mrs. F. Age 25. Small and delicate, weight 90 pounds. Ten years ago was shot in right temple by a jealous lover who, supposing that his victim was dead, committed

suicide by a shot in the head from the same weapon. The revolver used was a .38 caliber and was held so close that the powder burned the face.

Since the injury there has been con-



FIG. 1.

Radiogram showing bullet in orbit and pin placed over supraorbital foramen to localize it. Orendorff's case.



stant headache and great irritability manifesting itself in terrific explosions of temper, and there is also complete ptosis of the right eye and marked convergent strabismus. A depressed scar is present on the right temple at a point one inch behind and one-half inch above the external angle of the orbit. Radiograms showed that the path of the missile was horizontally inward and slightly forward, stopping at the upper part of the orbit and about two-thirds of the way back from the margin. The bullet turned point downward and the upper part was imbedded in the bone.

Under ether an incision was made at the external orbital margin similar to



FIG. 2.

Showing complete ptosis. Patient attempting to raise upper lid. Orendorff's case.

the part of a Kroenlein incision and the periosteum of the orbit was separated with nasal submucous elevators back toward the apex keeping well in the superior part of the orbit. In this manner a solid bony obstruction was encountered above and to the nasal side and back of eyeball. A Metznanbaum nasal retractor which is soft and pliable, which I consider very essential, was shaped to conform to the bulb, and the periosteum with the bulb was drawn in and down and forward as far as possible exposing the field to a surprising extent.

The bony obstruction was only a thin shell very easily chiselled away,

leaving the bullet exposed and so tightly imbedded that it could not be dislodged with a strong hemostat and a small mastoid chisel was necessary to loosen it. A battered soft bullet is, as a rule, hard to remove, and this one was no exception, for the patient manipulation required to get the long axis swung around in the right direction was the only difficult part of the operation, but the utmost caution prevented the sharp jagged edges from injuring the orbital structures.

Recovery with entire relief of pain was prompt, but the ptosis and squint persisted until relieved by operation last April. A recent letter from the patient states that it is almost impossible to detect that there has ever been anything wrong with her eyes. As the vision was at once 5/60 in the operated eye, and as it is orthophoric, a permanent, satisfactory result is anticipated.

While it is hardly possible that so simple a method of exposing the orbit for the removal of foreign bodies is original, I fail to find it recorded. If it should be considered too common to be worthy of a place in ophthalmic literature, I am certain that the use of a soft pliable retractor possesses wonderful advantages over any other kind, and this one feature alone is worthy of merit and justifies me in calling attention to it.

## DISCUSSION.

Harold Gifford, Omaha, Nebraska, did not remember seeing a similar case. (Orendorff in reply to Gifford's question said that the bullet was two-thirds of the way back in the orbit). He did not understand how the bullet could cause so much pain. He remembered a case in which a man on a railway platform was hit by a bullet fired from below into the air. No external evidence of the injury could be found, but the patient was sure he had been hit by the bullet and that he could not see. The X-ray showed a bullet near the optic foramen. There was a small wound of entrance deep down in the conjunctival sac. In that case the bullet was doing no harm and no further notice was taken of it. Axenfeld had devised a retractor for going into the orbit, but this was broader than that used by Dr. Orendorff and did not reach in quite so deep.

# IMPORTANCE OF TEMPERATURE CURVE FOR THE EARLY RECOGNITION OF INTRAOCULAR TUBERCULOSIS.

HARRY AUSTIN SMITH, M. D.

DELTA, COLO.

Paper including reports of two illustrative cases read before the Third Colorado Ophthalmological Congress, August 10th, 1917, with discussion.

It will add to the clarity of the title if extended to include retinal vessels as well as posterior chorio-retinitis. In searching the literature, which was not very extensive, and referring to the late text-books on the subject, there was no instance in which the diagnosis of tuberculous retinitis was put on a firm foundation. By exclusion, and as a last resort, the conclusion is reached that tuberculosis is the intraocular lesion.

There is no new principle or pathology to be introduced by the writer. But a different interpretation and application of old ones. The history and pathology of tuberculosis needs no repetition at this time.

The indictment against the oculist for failing to recognize a tuberculous lesion of the fundus is severe. The discovery of a fundus lesion by the ophthalmoscope should immediately call to the examining surgeon's mind the trinity; syphilis, nephritis and tuberculosis. What the Wassermann is to syphilis, albumin and blood pressure to nephritis; so is the temperature curve to the tuberculous fundus lesion.

C. Adam, of Berlin, states in his book *Ophthalmic Diagnosis*: "Exclusion of every other cause \* \* \* and the existence of tuberculous lesions elsewhere in the body" then a fundus lesion may be called tuberculous. It is to emphasize the point that it is immaterial whether there exists, or the internist finds, a tubercular lesion elsewhere, that I present this paper. It is better logic to assume that a fundus lesion is primary than to insist that a lesion must be found somewhere else in the body.

In tuberculous meningitis, or miliary tuberculosis with fundus lesion, the diagnosis is selfevident. Given a

young and healthy appearing patient with a fundus lesion, negative Wassermann and normal urine, there is then only one constant symptom left to look for—temperature rise and fall. It is as important that the temperature be recorded below normal as above. Some patients will vary from one to two degrees; all below the  $98\frac{3}{5}$ ; and this below normal variation is a characteristic of tuberculosis. The ones whose temperature ranges high, suffer from mixed infections. It is understood that a patient with retinitis albuminurica may have a pulmonary tuberculous lesion and various other combinations can be thought of.

The use of tuberculin in diagnosis by causing a systemic reaction, as is generally recommended, may cause more injury than the original lesion. With the ophthalmoscope and small doses of tuberculin, the diagnosis can be as surely made and without the inconvenience and danger to the patient. The diagnosis of tuberculosis of the fundus is not established by a systemic reaction, if there is not a fundus change visible with the ophthalmoscope, or blurring of the vision. It is dangerous to give a large diagnostic dose of tuberculin in tubercular retinitis, or hemorrhage from either the retinal or choroidal vessels. Severe focal reactions may destroy already damaged nerve filaments. In hemorrhage caused by tuberculous erosion, it is safer to wait until nature has made some attempt to cure the process by clot organization than to seek for a tubercular reaction, which in this condition probably would cause increased hemorrhage. This is the important field for a close observation of the temperature curve. There is no other disease that produces the



same characteristic curve as tuberculosis. The temperature taken carefully for a week, with the blood examination, which is below normal in red blood corpuscles and hemoglobin, together with a negative Wassermann and urinalysis, permits us to arrive at the diagnosis of tubercular retinitis immediately.

The microscopic pathologic picture as seen with the ophthalmoscope: spots variable in number, one to as many as forty; white, small, large ones by confluence; lace-like edges; pigmentation slight or lying adjacent to lesion; edges not sharply defined in all lesions; retinal vessels intact, and passing over large spots; choroidal vessels not visible. Patient has not complained of pain, and loss of vision has come on slowly. In the cases to which I refer, the patients have the appearance of health and are attending to their usual affairs. The cases appended below may bring out the idea clearly.

#### TUBERCULOUS RETINITIS.

Miss M., age 45, business woman, had common diseases of childhood: "About the middle of August, 1915, I had an attack of cholera morbus, lasting for a couple of days. When I recovered, I noticed that I did not see so well." The first of September, 1915, consulted her oculist. He found several small spots in the right eye. Diagnosis of choroiditis made. Potassium iodid prescribed. Middle of September, 1915, consulted an oculist in another city. He found spots in the right eye and prescribed her correction with the assurance that the correction of the error of vision was all that was needed. In October, consulted two oculists in St. Louis. With her correction, which was prescribed, vision was still normal. About this time, however, binocular vision began to be annoying. In February, 1916, consulted another oculist: vision at this time was 20/100 in the right eye with correction. From this until June, she consulted two other oculists. June 9, 1916, the patient consulted me. Right eye; area approximately the size of a disc in the lower, outer quadrant, posteriorly. A very

small amount of pigment at the upper edge of the lesion. In the upper, outer quadrant there was from thirty to forty small white spots. Left eye; one small tubercle at about the equator, well forward in upper nasal quadrant. Vision at this time, with the right eye, was fingers at two feet with the eye rotated outward. Left eye, 20/20. During the following week, a Wassermann proved negative; the urine was all saved and examined chemically and microscopically every day; two blood counts were made during the week and the hemoglobin was 85; the red blood cells 3,280,000; whites 12,400; temperature varied from 96 to 99 degrees during the week. This patient was carrying on her business with no complaint about her general health, except a little tired. Undoubtedly in this case, a record of the temperature curve for one day would have at least pointed the way to the diagnosis. The suspected diagnosis of retinal tuberculosis was made positive. The patient ordered to take a year's rest in Colorado. On July 15, 1916, Dr. Edward Jackson saw this case in consultation and confirmed the diagnosis. Treatment and results follow: Rich food, exercise, rest and tuberculin. The dosage of tuberculin was followed and regulated entirely by the ophthalmoscopic findings, which follow in detail.

At this time the patient left to spend the winter in California. She was provided with a hypodermic and instructions to continue 1/100 mg. every two weeks.

- 10/25. Focal and local reaction.
- 11/ 1. Focal and local reaction.
- 11/15. Focal and local reaction.
- 11/29. Focal and local reaction.
- 12/13. Focal reaction.
- 12/27. Focal reaction.
- 1/10. Focal reaction slight.
- 1/24. Slight reaction.
- 2/ 7. Very slight reaction.
- 2/21. No reaction.
- 3/ 7. No reaction.
- 3/21. No reaction.
- 4/ 4. No reaction.
- 4/17. No reaction.

Patient was seen again on May 18, 1917. Both eyes were quiet. Vision:



right 20/200, International test charts 0.1.

#### CHORIO-RETINITIS.

Mrs. V. Age 23; apparently perfect health; one child; typhoid fever the only disease she ever had. Temperature range; five years after, fundus lesions appeared. Temperature taken for one week, three weeks ago, shows a range of one degree.

#### TUBERCULOSIS OF RETINAL ARTERY.

Male; age 25; weight 170; height five feet eleven inches; farmer; had just finished harvesting a large summer's crop. Negative Wassermann. Hemorrhage in right eye 9/18/15. Discharged 2/27/16. Temperature during the time varied usually about two degrees a day. Temperature chart appended was temperature range first week in June, 1917.

7.16 3/2500 mg.

7.20 3/2000 mg.

7.25 1/400 mg. Slight focal reaction, evidenced by slight blurring of vision. Ophthalmoscopically, a slight redness and swelling around the entire edge of the large spot. Marked at the upper extremity.

8.3 1/250 mg. Beginning 24 hours after the injection, a dimness of vision could be noticed by the patient and with the ophthalmoscope, redness around the edge of the larger area and a slight swelling around all the small tubercles. In the next thirteen injections, the same reaction could be seen around each tubercle.

8.8 1/250 mg. Same.

8.14 1/250 mg. Small arterial branches appearing in bottom of lesion.

8.21 1/250 mg. Small artery at outer edge of large lesion.

8.28 1/250 mg. Extension of artery at outer edge.

8.31 1/250 mg. Pink mesh of vessels in center of white area.

9.4 1/200 mg. Reaction more marked at periphery of lesion.

9.9 1/125 mg. Marked blurring of vision, redness around large area prominent, increase of fine branches from retinal artery. Increase of pink area in center of large lesion covering almost inner half.

9.11 1/125 mg. Same focal reaction as with previous injection. Appearance of very fine vessels at inner margin of large lesion extending about one-third across.

9.15 1/100 mg. Focal reaction same as previous. At this time, another vessel in center of lesion extending about one-half way up.

9.18 3/100 mg. Severe focal reaction evidenced by blurriness of vision, pinkness of almost entire area, as well as a marked local reaction.

9.23 3/100 mg. Severe local and focal reaction. Vision very blurry, and was now able to trace the vessel at the inner edge of the large lesion entirely across it.

9.30 1/100 mg. The dose was diminished on account of the severe reaction at the preceding injection.

10.11 1/100 mg. Mild focal reaction. The vessel in the center of the lesion can now be traced entirely across it. Three new vessels now across the lesion, in addition to the original arteries that crossed it.

	A. M.		P. M.
Tuesday .....	6:00	97.2	9:15 98
Wednesday....	5:30	96.6	8:00 98
Thursday .....	...	...	8:30 97.8
Friday .....	6:30	97.6	6:00 98
Sunday .....	...	...	4:00 98.8
Monday .....	6:00	97	8:45 98.6
Tuesday .....	5:30	96.4	12:25 97.6
Wednesday....	...	...	9:30 98

TUBERCULOUS CHOROIDITIS: L. F.; age 27; hoisting engineer, and semi-professional baseball pitcher. Negative Wassermann, urine normal. For a few days scotoma; subretinal hemorrhage, came on while reading in the evening. Everything turned red; consulted me two days after. Following is a week's temperature chart:

3/ 8/17	3 P. M.	99
3/ 9/17	8 A. M.	97.6
	1 P. M.	98.4
	7 P. M.	98.6
3/10/17	8 A. M.	97.4
	1 P. M.	99.4
	8 P. M.	98.6
3/11/17	8 A. M.	98.6
	2 P. M.	99
	7 P. M.	98.8

3/12/17 8 A. M. 98.6  
1 P. M. 98.6  
5 P. M. 98.8  
3/13/17 8 A. M. 98  
1 P. M. 99  
8 P. M. 98.6

Summary: 1. The temperature curve is the one fixed factor in tuberculous fundus lesions.

2. Tuberculin, for diagnostic purposes is useless if the ophthalmoscope does not show a focal reaction.

3. The dosage of tuberculin should be regulated by the ophthalmoscopic changes.

### DISCUSSION.

C. N. Meader, Denver, Colorado. Dr. Smith's points with regard to the importance of the temperature curve are well taken, and they are especially true with regard to focal lesions of slight extent, as in the eye, where the temperature is relatively neglected but important. The tendency to a subnormal temperature beyond the range of the normal person is significant, and especially the labile temperature curve as though the temperature center were hypersensitive. One other point with regard to the temperature curve also is important, that is the tendency to a subnormal temperature in these slight tuberculous lesions, the tendency to a subnormal temperature brought on by exercise or fatigue. A great many of these patients will say that exercise does not tire them; yet on taking the temperature before and after exercise subnormal temperatures are recorded. I have been watching a few patients who are on graduated exercise, with that point in view, and have used this as a test as to whether exercise was beneficial or detrimental, and I believe this is a useful test as to the amount of exercise a given patient can stand. A patient with a suspicious eye lesion and who shows a temperature curve with a distinct tendency to subnormal or hypernormal after exercise is unquestionably a suspect. I was interested in the statement as to the likelihood of a temperature rise in ocular lesions. One would suspect that one would be unlikely to have a temperature rise from an ocular lesion. This might be explained on the basis of the relative vascularity of the eye and of the lungs. In these cases a thorough physical search would probably demonstrate a focus somewhere else, and also that the disease was not limited to the eye.

The question of large doses of tuberculin for diagnosis is important. The avoidance of large doses and of severe systemic reactions is of great importance in searching for a focus either in the lung, the body in general, or the eye; especially in the eye, in which so great damage may be done to

delicate structures. In the process of giving tuberculin for a suspected lesion in the eye, we may quite unexpectedly clear up a systemic lesion which was not frank yet was interfering with the patient's efficiency.

I have in mind a patient whom I saw with Dr. Jackson. He had had both testicles removed nine years earlier for tuberculosis. He has long series of alternating cycles; some years of activity and some weeks of depression, inability to perform his tasks, mental or physical, with satisfaction. The question came up whether there was some effect on his adrenals from tuberculosis. Under tuberculin, not only his eye has partly cleared up, but he is free from his periods of depression, although there is no focus to be found elsewhere in the body, except a slight inactive focus in one apex.

Edward Jackson, Denver, Colorado. With reference to the main subject of the paper, the temperature, I feel that perhaps I have been neglectful. I have certainly not attempted to follow the temperature in these cases. I have had the feeling that probably the changes are so slight that unless the temperature is very carefully taken, and the conditions fairly well controlled under which the patient lives, and under which the temperature observations are made, we may get data that will be confusing rather than illuminating. We have to deal with a comparatively slight change of temperature, and to separate that from the normal daily variation may be puzzling. In the matter of local reactions we are in a better position to make accurate observations.

In some cases it is practically impossible to follow the changes closely, because of the amount of hemorrhage present. But there are a few cases in which it is possible to follow them very closely, and in these cases the focal reaction ought to be looked for carefully. In the case that Dr. Meader alluded to, at all times the retina has been open to inspection. There have been several small hemorrhages, but none that completely hid any part of the fundus. Yesterday the process of clearing up of the white spots in the retina which Dr. Smith has alluded to, which have been very marked in this case had made progress. These spots are located in the macular region; and suggested an albuminuric retinitis. They are distinctly clearer than they were ten days ago, and the patient's vision has risen to about 9/10 partly, better than it has been for the past year, or since the attack commenced.

In that case I have noticed slight evidences of reaction, not in these white spots in the macula, but in the vascular opacities along the upper vessels, in the region where the small hemorrhages have occurred. Coming back to the temperature, I have noticed in several patients that came as comparatively healthy young persons, that observing them closely they have ups and downs; there is anemia, perhaps, with fatigue from relatively moderate exertion, which is to



them overexertion. If we had watched closely the temperature changes we should probably have got from them important evidence.

C. A. Ringle, Greeley, Colorado. I am convinced that even a focal tuberculous lesion in the eye may be the cause of a severe temperature curve. Besides it is highly possible that we shall find in such cases a focal lesion elsewhere, and in all probability in the lungs.

H. H. Stark, El Paso, Texas. Regarding the temperature curve, I am very strongly impressed that it is one of the things necessary in making a diagnosis. Many of my cases examined by the lung specialist in the last few years have shown little or no activity. This was especially noticeable in a nurse I saw, in whom there was a corneal condition, with small opaque spots beginning at the limbus and gradually coming in toward the center of the cornea. Examination of her lungs showed no activity at all, but her temperature curve was decidedly noticeable, as showing a subnormal temperature in the morning and a rise in the afternoon. We need everything we can get in making our diagnosis of tuberculosis. I should like to know the experience of other men who have been doing the complement fixation test for tuberculosis. In only one case have I had a positive reaction, and in that case the condition proved not to be tuberculosis of the eye.

In a case in which the tuberculin had been gradually run up, the patient noticed a decided redness of the eye, which he had treated by the barber, with murine and hot towels. After the next dose of tuberculin he got an extremely severe reaction, the dose being three-thousandths of a milligram. Fortunately I succeeded in getting the pupil dilated, so that the eye came out very well, but the case was a decidedly severe one.

Otis Orendorff, Canon City, Colorado. The early diagnosis of any tuberculous lesion of the eye is extremely difficult, yet that is the time to make a diagnosis if we are to accomplish anything. The valuable

point brought out in the paper with regard to diagnosis is that concerning subnormal temperature.

Harold Gifford, Omaha, Nebraska. We should not give up the idea that the patient has tuberculosis because we fail to get a reaction with tuberculin.

F. R. Spencer, Boulder, Colorado. Von Hippel has reported a case in which an eye that was tuberculous failed to give any reaction when the patient was given five mg. of tuberculin. I do not depend absolutely upon a tuberculin test, just as I do not depend absolutely upon a Wassermann test. We must be on our guard in these cases. Another point worth remembering is that in children the focus may be in the cervical lymph glands.

Marcus Feingold, New Orleans. Ever since the report of Stock we have been looking for causes of tubercular manifestations in the eye and in all cases of uveitis not manifestly due to other conditions such as lues, a search for tuberculosis was instituted with the aid of the internist. After observing pulse, temperature and respiration for several days a tuberculin injection was made. We have so far failed to get either a local or general reaction. Dullness in the lung, or distinct feathering, or a shadow at the hilus by the X-Ray, are not sufficient material upon which to base a diagnosis of retinal or ocular tuberculosis. We must remember that a great number of us who will die of other diseases and who have never had any manifestation of tuberculosis may actually have had this disease.

We must find an active tuberculosis if we are justly to conclude that the given eye condition may be possibly due to tuberculosis. Changes in the temperature, as have been brought out, and especially the lowering of the temperature after exercise, ought to be fairly valuable aids. As to retinal tuberculosis I must confess that none of the cases I suspected of being tubercular had any resemblance to those that I saw through the kindness of Dr. Jackson. Apparently your opportunities in Colorado to see ocular tuberculosis are greater than ours.

## A CASE OF MASSIVE RETINAL EXUDATE.

MELVILLE BLACK, M. D., F. A. C. S.

DENVER, COLO.

Report of a case read before the Third Colorado Ophthalmological Congress, August 10th, 1917.

A most interesting case came under my care in November, 1915, through the courtesy of Dr. J. C. Strong of Leadville. The patient was a young Irishman aged 23 years. He was a metaliferous miner, of florid complex-

ion and stocky build, and was as strong as an ox. He said his left eye had been bothering him a little all summer, and that about a month ago he put his hand over his right eye and found he could not see with the left. Four days ago



he was bending over at his work and when he stood up he could scarcely see with his right eye.

An ophthalmoscopic examination of the right fundus showed numerous hemorrhages throughout the temporal half of the retina. The disc had a slightly edematous appearance. The veins were engorged and looked very dark in color.

The left fundus presented the most remarkable appearance. At first glance it appeared as though the retina was extensively detached, but the retina had no movement. The next thought was that there was a growth under it. The whole nasal half of the retina and region of disc, which was entirely obscured, was seen best with a +8.D lens in the ophthalmoscope. A little to the temporal side of the median line the retinal level plunged suddenly down, like a precipice, to a plane below in the macular region. This lower level was hazy and no retinal details could be made out. The elevated plane gave the appearance of a mountain of exudate in which blood vessels ran in a most irregular manner. They would appear on the surface and dip again out of sight. At the rim of this swelling the vessels were numerous and small, and in places formed a tangle, part of which appeared projected free into the vitreous.

The hemorrhages in the retina of the right eye underwent constant change and very shortly the nasal side of the retina became edematous, the normal vessels obscured and the optic disc partially obscured and the level of this region was elevated. New vessels began to form and in the course of a few months time the appearance of the right eye resembled very closely that of the left.

The vision of the left eye when I first saw him was almost nil, the vision of the right eye was 20/30, but it gradually got worse and worse until in six months it was 2/200.

This case was seen frequently by a number of gentlemen present at this meeting. Several of us felt that the process was tuberculous, and working upon that hypothesis he was given tuberculin during the entire period of six months that he was under my care. It was possible to produce a general and focal reaction at any time by giving a large enough dose. In addition to the tuberculin he was given large doses of iodine in the form of iodopin hypodermatically. He was also given mercury by inunction. Early in the treatment he was given strychnia and 2 gr. calomel twice a week. This treatment was largely empirical because the extensive laboratory work done on this case revealed nothing that could be assigned as a positive cause unless it was tuberculosis.

In addition to this, his teeth, which were usually good, were cleaned and put in good shape. His nose and accessory sinuses were examined and radiographed with negative results.

After being under our observation here for six months he went to New York and I have lost track of him since then. It was a most interesting experience to see the same condition gradually develop in his right eye that had already reached its height in the left. It was also quite difficult to understand why an apparently healthy, robust young man, free from luetic taint, should develop such a formidable disease first in one eye and then in the other. The selective tendency of the process to attack the retina, and that the nasal halves of each should have been chosen as the sites for the massive exudate also seems rather remarkable.

#### DISCUSSION.

HAROLD GIFFORD, Omaha, Nebraska. There has been at least one case of Coats' massive exudate of the retina which was mistaken for glioma; really thus representing a form of so-called pseudoglioma.

# DISTURBANCES OF VISION IN PATIENTS HARBORING CERTAIN FILARIAL TUMORS.

PACHECO LUNA, M. D.

GAUTEMALA, C. A.

Professor Luna in this preliminary paper calls attention to an extremely interesting form of ocular disease apparently dependent on the presence in the body of a special filarial parasite. Translated from the Spanish for this journal.

To my good colleague and friend, Dr. Rudolph Robles, I owe the opportunity of having been able to study in more than one hundred individuals the ocular disturbances which appear in persons attacked by the disease commonly known by the name, "Coast Erysipelas," which is very prevalent in certain regions of this republic.

Dr. Robles is the first among us, and probably on the American Continent, who has interested himself in this epidemic, which greatly endangers the vision. He has discovered that the cause of coast erysipelas is a parasite, and also the intimate relation between the organism mentioned and the symptoms which manifest themselves in the individual who carries it. The parasite is not perfectly studied, but it is a filaria, which seems to be of the genus, *Onchocerca* (and at one time must have been imported from Africa), and the species *Onchocerca volvulus*. Leuckart, 1893.

The doubts which prevent it from being included definitely in the species named, rise out of some difference in certain zoologic characters; and because of the fact that none of the European authors mention in their descriptions, the ocular symptoms observed by us, and which have been really the most important in our patients, and they have not been reported from the studies made in the infected regions in Africa.

However, whether the parasite is of the species named or of another, I shall deal only with the notes concerning the visual disturbances which I have met with among the carriers of this filaria, observed by me in Guatemala, and

which I shall call onchocercosis, in order not to confuse them with those which underlie the wellknown diseases called by the names of filariasis, dracunculosis, volvulosis, etc. These points are entirely preliminary, without any pretense to definiteness, much less completeness, and are subject, consequently, to change when the observations have been extended to a greater number of cases, or when the studies of other physicians clear up many uncertainties.

## CLASSIFICATION AND DIVISION.

Taking the clinical symptoms as the basis of my classification, I will first divide the forms which I have noted into two classes.

The first I will call normal or regular, because the cases included under it are those which appear most frequently, and seem to be the more or less advanced stages of a slow and progressive course, which in the majority of those infected, lead me to believe that they are in direct ratio to the age of the infection.

I will designate the second by the term, abnormal or exceptional, on account of its being very rare and differing from the former in regard to its objective symptoms.

## NORMAL OR REGULAR FORM. FIRST OR ACUTE PERIOD.

The patient experiences a feeling of dryness of the conjunctiva in both eyes, a smarting pain without vascular injection. In a few days, a very intense photophobia is established, by reason of which he shuns the light, shielding and covering his eyes with his hands,

or turning his back to the light. The pupil is contracted to the utmost. The patient begins to complain that he sees badly, sees worse, sees objects as if in a mist, and finally distinguishes only shadows.

At this stage, an objective examination demonstrates a lack of conjunctival and ciliary injection. The cornea is invaded from the periphery toward the center, predominating in the part disclosed in the palpebral fissure, by very small, dot-like, whitish, superficial infiltrations (Fig 1). These infiltrations are not elevated, although situated in the epithelial layer; some are so fine that they may pass unnoticed if not examined by oblique reflection and increasing the image by means of a lens or corneal microscope. Iris normal. Ophthalmoscopic examination negative.

We are dealing, then, with a superficial, chronic keratitis punctata, which recalls to my mind the superficial keratitis punctata described by Fuchs in 1889, whose etiology at that time and even today, it has not been possible to explain. The keratitis mentioned has also been described by the names of central, subepithelial keratitis, by Adler; macular keratitis, by Reuss; and by others by the names of superficial keratitis, nodule of the cornea, etc. The course is rapid; it arrives at this stage in a few days. I have the case of a child five months old, who presents the picture of the final stage; and in whom, according to the mother, the first signs appeared two months after birth. The lesions described run a chronic course, lasting for years, and diminishing with time; but they do not disappear entirely. In all the cases in which the cornea has been concerned, there remain permanent infiltrations, which lessen the visual acuteness.

Before proceeding further, and in order to finish with this picture, permit me to illustrate the point by means of one of my own observations, which is most interesting, because that of an intelligent and educated person, who gives a perfect account of what happened, and answers questions satisfac-

torily. It is concerning the manager of a firm in the zone of Yepocapa, who has discharged this office for fifteen months, and who lived before in the United States of Colombia. Age, 36 years. Malaria formerly. Eyesight normal until four months previously, at which time he believed he had a disease of the eyes, mild at first, but which increased in intensity, photophobia predominating. In short, his sight was affected until he could no longer read, and could see only shadows. He came here and consulted an optician, who referred him to a physician as not being a matter of his specialty; my colleague allayed the pain by prescribing an eye-wash of adrenalin-cocain, but not experiencing relief, the patient decided to consult me.

I found photophobia; the patient could not endure light; he covered his eyes with his hands, turned his back, and it was not possible to examine his eyes in the consulting room. In the dark room with oblique illumination, I succeeded in overcoming the tonic blepharospasm and seeing the eye imperfectly. Bilateral lesions, absence of secretion, lacrimation, and conjunctival and ciliary injection. Corneas transparent. They permit the examination of the iris and the fundus of the eye; but they are irregularly adorned by dot-like, opaline infiltrations, most of them not so large as half the diameter of a pinhead, superficial, of the epithelium, not elevated, more abundant in the periphery and the number greater in the horizontal diameter, no vascularization or ulceration. Iris shows changes in color, which seem to be due to the changes in the cornea. The pupils are contracted, but they react to light and convergence. Tension normal.

I assured him that the lesions were those of the onchocercosis, and then he told me that there were many eye troubles in the zone, asking me whether a small tumor on the neck might not be that of the filariasis. At that time, my experience was only of four cases of superficial keratitis punctata onchocercosa, already treated, and I was not familiar with the tumors. Therefore I sent him to Dr. Robles, who extracted



the tumor on the day following, and showed me the filaria.

#### ABNORMAL OR EXCEPTIONAL FORM.

The first stage of the chronic condition is a continuation of the former; the keratitis, and consequently the photophobia have diminished, but have not disappeared entirely, and the visual acuteness has lessened to such a degree

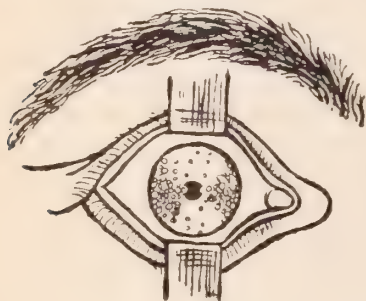


FIG. 1.

Early stage of usual form. Superficial corneal infiltrations of different sizes, mostly near the horizontal diameter and limbus. Pupil contracted. (Pacheco Luna).

that the patients can perceive only shadows at a short distance. The iris has a dirty tint and the delineation is rough; the pupils regularly contracted, react neither to light nor convergence, and the iris adheres by the free edge to the anterior surface of the crystallin lens. Mydriatics do not dilate them (Fig. 1). The pupillary seclusion is not shown by ballooning of the iris and increase of tension, but the iris remains smooth and stretched. The pupils are clear, do not develop false pupillary membranes, and where the corneas permit it, the fundus of the eye can be illuminated, and does not present any appreciable change. We seem to be dealing, then, with a special, chronic, fibrinous iritis of a slow and insidious course. The disturbances of this kind are numerous, but always subject to the first group, and amaurotics are not observed.

#### THIRD PERIOD, OR SECOND STAGE OF THE CHRONIC CONDITION.

Although I do not possess a sufficient number of observations to decide whether the manifestations of the onchocercosis which I include here, are

really the evolution of the chronic form or another special form, the symptoms which I am going to enumerate have been found by me only in old chronic cases, and I am inclined to suspend judgment until new observations prove it.

The infection at this period dates for many months. On some occasions, it is so old that the tumors have disappeared. The blind are numerous, and those who are not blind are so far on the road, that we can affirm that the course is toward that condition. The picture which the few onchocercotics here collected presents is very different from those we have described. There are amblyopias, in which the patients experience a certain photophobia. In all is noted an absolute absence of an acute process.

The superficial keratitis punctata has the peculiarity of presenting the greatest number of elements in the lower half of the cornea, the latter increasing in the proximity to the lowest point of the limbus, being sometimes so close that they form a uniform, diffuse infiltration resembling ground glass.

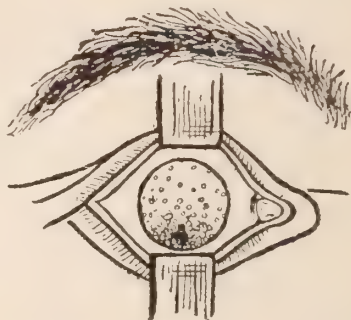


FIG. 2.

Later stage of chronic superficial keratitis punctata. Infiltrations chiefly in lower part of cornea. Fibrinous iritis. Pupil drawn down almost to lower limbus, an irregular vertical oval. (Pacheco Luna).

The iris appears smooth, the part above the pupil stretched; the part below the pupil adhering, and applied to the crystallin lens (Fig. 2). The pupil occupies the lower half of the anterior segment, the latter turning down, and in some very old cases, even touching the corneal limbus. Its form is irregular, the greatest diameter vertical. It

does not react, and seems to be dilated in a small space when a mydriatic is instilled. In the cases of complete blindness, a false membrane hides the pupil. On withdrawing this, the pupil is found to be reduced to a point or obliterated. In this case, its place alone is recognized by a slight, almost imperceptible umbilication. The pathogenesis of so singular a deviation might be explained by a process of fibrinous iritis, in which there is no pupillary retraction, and in which, by reason of its weight, the fibrin descends and causes it to adhere to the part of the iris which is beneath the pupil and the anterior surface of the crystallin lens, the rest of the iris remaining free, and the fibrin on being retracted, deflects the iris downward.

During the time that Dr. Domingo Alvarez was chief of the Eye Department of the General Hospital, a dozen of these patients had eye operations. The result of these interventions is curious and interesting. They see less and are blind on the side operated upon. The visual acuteness of the other eye is better in spite of the fact that in some, the openings which have been cleared are large, and the media transparent. This fact shows that the diminution of the visual acuteness is not due so much to an obstacle in the media of the eye, which hinders the passage of light rays, as to a change inappreciable to our means of investigation. Proofs of this are the patients which correspond to the picture yet to be described, and which I will explain further on.

#### ABNORMAL OR EXCEPTIONAL COURSE.

The objective lesions of the eyes are not distinguished. They present, nevertheless, photophobia and diminution of visual acuteness. Among them are some recently affected, and others of much longer duration. A person of this class saw so little that a guide led him. He was operated upon, and the following morning walked alone and saw perfectly. The visual acuteness had

increased so much that he who had to be led on the day before, could now distinguish the horizon at a distance of many kilometers. A German without objective ocular symptoms boasted that he saw perfectly, nevertheless his visual acuity was 0.7. It was necessary to extract the tumors in order to convince him of this diminution. He then declared that he saw much better. A lady of high social rank had to consult an optician because her sight suffered increase and decrease of visual acuteness with irregular alternations. As he could not improve it, he suggested that she had a fissure in the retina, and should go to the United States immediately, or she would lose her sight. In New Orleans, Dr. Feingold, the famous oculist of the South, examined her a week after, gave the authoritative opinion that she did not have a disease of the fundus of the eye, but that he was dealing with a defect of refraction which could be corrected by lenses. She went at once to New York, where Knapp saw her, and he also affirmed that there existed no lesion of the eye, and that she needed proper glasses. The lady returned without having obtained any improvement, and this caused her much anxiety, until I extracted a filarial tumor, which she had had for a long time, and which was situated near the end of the right eyebrow.

In a general way, the lesions described, however different they may appear to be, have something in common. They appear in the onchocercotic, all of whom suffer disturbances of vision; the lesions are lasting, do not decrease, seem to be progressive and chronic, and the visual acuteness increases considerably and rapidly only when the tumors are extracted. For this reason, it is presumed that all the symptoms are due to the secretion from a parasite in the human organism, of a toxic substance, which produces at times appreciable lesions in the eyes, and at others, lesions inappreciable by our means of investigation.

THE ANTIGENIC PROPERTIES OF UVEAL TISSUE AS SHOWN BY  
COMPLEMENT FIXATION

ALAN C. WOODS, M. D.

PHILADELPHIA.

Abstract from *The Archives of Ophthalmology*, vol. 46, p. 503, by William F. Hardy, M. D.

The studies of Alan C. Woods of Philadelphia relative to ocular anaphylaxis have profound scientific importance. The previous papers dealt with the anaphylactic theory of sympathetic ophthalmia; the experiments described therein showed that the pigment of uveal tissue possessed the antigenic properties necessary to make the anaphylactic theory of sympathetic ophthalmia a scientific study. In its anaphylactic reactions, pigment acted as a foreign protein, an antigen, in animals of the same species; it was organ specific and not species specific.

Elschnig reached the same general conclusions. Certain phases of his work have been confirmed, but not his fundamental observations as a whole. A historical sketch of Elschnig's work is given together with his conclusion that uveal tissue could act as antigen in the same species of animal, and that the pigment was the constituent of uvea responsible for this. An additional point shown by Elschnig was that the fixation of complement by uvea and pigment immune sera, with uvea and pigment antigens, was due to the insoluble portions, pigment, in the antigen suspensions.

Woods explains his experimental technic and points out the chief pitfall in experimental complement fixation in dogs and rabbits, which is nonspecific fixation. Antigens of cows' uvea and pigment, and of dogs' uvea and pigment were used. The results of the work are shown in tabular form. The antigens were not of equal value. The alcoholic extract of uvea appeared to be without antigenic properties and was abandoned. On the whole, the two best antigens were the emulsion of

uvea in salt solution, and the suspension of unheated pigment in salt solution. The results shown in the first table demonstrated two points:

(1) That uveal emulsion possesses the ordinary antigenic properties of protein, and (2) The uveal pigment possesses also the same common antigenic properties.

Table II illustrates not only the property of uveal tissue to act as antigen in the homologous animal, but shows also that the pigment is responsible for this property. This substantiates Elschnig's findings.

Table III illustrates the organ specific properties. The sera of animals immunized to uvea fix complement with any uvea antigen, regardless of species. Pigment acts likewise, and it is probably due to the pigment content that uveal tissue owes this antigenic property. This again confirms Elschnig.

With Woods, the sera of animals immunized to whole uvea were species specific, and although from his work with complement fixation he could not definitely state that uveal pigment is not species specific, he is inclined to that view. It seems certain that practically all the fixation of complement shown by immune sera with uvea and pigment antigens is due to the constituents, chiefly pigment, suspended in the antigens.

The relative value of antigens is held to be a point of clinical interest. Some observers have claimed that the sera of patients with sympathetic ophthalmia will give fixation of complement with uvea and pigment antigens. The truth of this has not been established. If ex-



isting or threatened sympathetic ophthalmia can be detected by this means, it is of great interest and importance. For this work the best antigens are the fresh salt solution, suspension of cows' uveal emulsion and cows' unheated pigment, used in one-third, or one-half, the anticomplementary dose. If but one antigen is used, the emulsion of the whole uvea is to be preferred. In the author's hands, cow antigens have given the best results and are the easiest obtained.

The summary is as follows: "Dogs have been immunized to emulsions of foreign and homologous uvea, and to foreign and homologous uveal pigment. The complement fixation properties of these sera have been studied in order to verify the similar work of Elschnig, and more firmly establish the points assumed by the anaphylactic theory of

sympathetic ophthalmia. Emulsions of whole uvea and uveal pigment possess ordinary antigenic properties. Moreover they are capable of acting as antigens in the homologous animal, and the pigment is the constituent of uveal tissue responsible for this property. In its immunologic reactions, uveal pigment is organ specific and not species specific.

"The best antigens for fixing complement with immune sera are fresh salt solution emulsions of whole uvea, and fresh salt solution suspensions of unheated pigment. The fixation properties of these antigens are due to the insoluble constituents suspended in the salt solution menstrum." A careful reading of the original article is recommended especially for the correct appreciation of the tables accompanying the text.

### SHORT ABSTRACTS.

Under this heading are included notices of the most important points of interest that appear in the recent literature which are capable of brief statement. For the systematic review of the whole literature of each subject the reader must consult the "Digest of the Literature," a part of which appears in each number of the journal, and which will be complete within the year. The initials appended to each abstract are those of the collaborator who made the abstract; abstracts made by foreign collaborators or by contributors whose names are not published in the list of collaborators are signed with the abstractor's name.

**Dor, L. Retrobulbar Optic Neuritides.** (La Clinique Ophtalmologique, May 1917.) This is a most extreme article upon the etiology of the above mentioned condition. The author maintains that nineteen out of twenty cases of retrobulbar neuritis follow a slow periostitis at the root of the bicuspid teeth of the superior maxilla. This periostitis is frequently complicated by radiculo-dentigerous cysts, and fistulae. Pivots, gold crowns, or particles of root remaining after extraction may cause the inflammation. Besides producing the neuritis, Dor insists that many detachments of the retina, venous thromboses, hemorrhages, embolisms, choroiditis, iritis, keratitis and even cataracts have their origin in the bicuspid. Of course there are some other causes in a few cases. In simple accommodation asthenopia of several

weeks' duration, always suspect the teeth and guard against more serious conditions later.

J. S. W.

**Jocqs, R. Retrobulbar Neuritis and Insular Sclerosis.** (La Clinique Ophtalmologique, May, 1917. J. believes that multiple sclerosis is the most frequent cause of acute retrobulbar neuritis which is so early a symptom that the causative factor is not recognized. Fleischer has collected thirty cases. Often spontaneous recovery occurs, due to the regeneration of the broken nerve fibers and the cessation of the inflammatory edema. This is followed by a functional recovery although anatomically the lesion is still present. The signs of a retrobulbar neuritis which should cause a suspicion as to the etiology, are mentioned. Individuals between seventeen and thirty years are

most often affected. A unilateral onset is almost constant. The sensation of a veil before the eye with headaches usually usher in the disease and this is followed by a central scotoma much larger than is found in a toxic amblyopia and this scotoma becomes absolute in many patients. The fundus is usually negative, occasionally a slight hyperemia of the disk. The duration is never longer than eight weeks and the general nervous symptoms may not follow for many years. J. S. W.

**Lapersonne, F. de. Premature Enucleations in Base Hospitals.** (*Archives d'Ophthalmologie*, v. 35, No. 11, p. 449.)

The oculists at the base hospitals have frequently protested against the premature enucleations practised in field hospitals. It is rare that an eye has to be removed within twenty-four or forty-eight hours after a wound, and when this has been done it has frequently been the case that the tissues were badly slashed, foreign bodies and splinters of bone often left in the orbit, causing interminable suppurations, and leading to the formation of cicatrices which made the wearing of a prothesis almost impossible. Worse yet is the enucleation of both eyes, thus depriving the unfortunate soldier of all possibility of ever seeing again. The author cites a number of cases which were brought in after double enucleation, all of which were operated on either on the day they were wounded or within forty-eight hours, some of them having been seen to in a large ambulance at the front, the staff of which consisted of seventeen surgeons without a single oculist. There is no excuse for this undue haste, as the hemorrhage is never dangerous, panophthalmitis does not set in immediately, and the spreading of an infection to the meninges is certainly not prevented by a hasty enucleation; on the contrary, it is a fact that in deep wounds of the

orbit with escape of cephalo-rachidian fluid enucleation is disastrous.

On the other hand some sight has been saved to eyes which seemed lost. If blindness is unavoidable it is much better that the wounded should be prepared for their loss gradually, and not subjected to such a terrible privation at a time when their moral and physical conditions are at their worst.

M. W. F.

**Young, George. Macular Perception in Advanced Cataract.** (*Brit Jour. of Ophth.*, June, 1917.) The writer points out the difficulty in estimating whether the macula is sound when deciding to operate upon mature senile cataract. He describes two methods of deciding this point: He places a blackened disc with 0.2 mm. perforation in front of the test eye, 5 mm. in front of the cornea; this yields a retinal image of 0.3 mm.; in the dark room the light from an electric ophthalmoscope is brought close to the hole; the patient is told to fix the luminous dot and the disc is gradually removed as far as possible from the cornea to reduce the size of the retinal image; fixation must be maintained; sometimes the hole must be enlarged.

Another and more certain test is the following: He uses three discs, perforated by two, three, and four holes respectively, within a central area of less than 3mm. Placing them successively in the frame he approaches the eye as near as possible to the frosted focus light behind the largest aperture of the Thorington chimney. The patient is told to "look for the moon," and states, without hesitation or error, when two, three, or four moons are seen, pointing out their relative position, which is constantly changed by rotating the discs. The two-hole disc seemed to be most useful, each hand being used to follow the movements of the moons. C. H. M.

# SOCIETY PROCEEDINGS.

## SOUTHERN MEDICAL ASSOCIATION—SECTION ON OPHTHALMOLOGY.

ELEVENTH ANNUAL MEETING,

Memphis, Tenn., Nov. 12-15, 1917.

DR. THOMAS W. MOORE, Chairman.

### Ophthalmoscope, Retinoscope and Pupillary Disc in Refraction.

DR. ALBERT H. MASON, Waycross, Ga., showed a diagram to represent the front of the eye. The rays of light that pass through the periphery of the lens are brought to a focus sooner than those passing through the center. This is called spheric aberration. In a normal state, the eye does not allow the rays to pass through the whole lens, but only through an area two millimeters in every direction from the pole. The area through which the peripheral rays pass is three times the area of the normal pupil. The peripheral rays being in the majority, refraction of an eye without cutting these rays out does not correct the refractive error of the central portion. One should employ, in refraction work as regularly as one uses a cycloplegic, some instrument that will exclude the peripheral rays. The author's pupillary disc allows only a pencil of light equal to the diameter of the pupil to enter the eye.

DISCUSSION.—Dr. Robert Fagin, Memphis, Tenn.: I see that this instrument would be a good thing, although I have not tried it. Anything that will eliminate the peripheral rays will make it easier to get the proper correction. I put little faith in the ophthalmometer. Low degrees of astigmatism are hard to measure with the ophthalmoscope. I rely on the retinoscope almost entirely. I always use a cycloplegic up to the age of forty-five years, and sparingly afterwards. I always try to get the central rays, and not the peripheral.

Dr. George W. Price, Nashville, Tenn.: I think that this diagram is

misleading. If it were even approximately correct, every patient would suffer from spheric aberration; but this is not so, even in many in whom the pupillary space has been almost obliterated. The lines which pass through the peripheral portion of the lens would cover nothing like the space indicated by the drawing. Otherwise, we should have dispersion circles in almost every case of defect in vision; and, when using a cycloplegic, the patient would have a color refraction that would give a ring just around the light. So far as the use of the pupillary disc is concerned, I would not interpose any objection. Dr. Mason has presented to us an idea that is worthy of very careful consideration. That our subjective refraction work with the dilated pupil and with the normal pupil should be synchronous, is an idea that never occurred to me, until the appearance of Dr. Mason's first paper. The question of the ophthalmometer should not enter into the discussion, because Dr. Mason only mentioned it incidentally.

Dr. Mason, closing: I believe that we are right in assuming that any ray of light that passes through the refractive media of the eye and does not pass through the three, four or five millimeters of pupil that we have to start with, is a peripheral ray. That being true, we have not been refracting our patients with absolute correctness. When I first began using the little disc to correct spheric aberration, I took ten cases and refracted them with and without the disc. The results proved to me that in doing refraction, if we attempt to correct every bit of the hypermetropia present, using this little



device, or something else that will cut down the peripheral rays; and give our patients glasses that are a little stronger, they will be able to wear them comfortably. If you wish to get something that will answer the purpose of this disc, you may, for a small sum, get a black disc, something like a pin-hole disc, in which you can have a four millimeter opening made. Use it in the trial frame; and try first refracting with this, and then without. Then you will see for yourselves the difference in the results you obtain.

### **Removal of Foreign Bodies from Eyeball and Orbit.**

DR. DUNBAR ROY, Atlanta, Ga., said: I have five cases to report. By the aid of patience and perseverance, we are frequently able to bring about a happy result in these cases. The first case is interesting as showing what may be accomplished in an eye that seemingly has been entirely destroyed. A piece of steel had cut through the cornea and lodged in the anterior chamber. The accident occurred in 1913. The man is still able to work and make a comfortable living. We should give every injured eye prolonged and careful treatment before resorting to enucleation.

In the second case, a piece of brass passed into the eye and lodged between the iris and cornea, deep down in the anterior chamber. It could be seen only when the patient looked down. For fear of causing peripheral separation of the iris by catching the foreign body and pulling the iris at the same time, I devised the plan of catching the pupillary margin of the iris and stretching it almost up to the upper border. This brought the particle of brass in front of the cut that had been made; and my assistant picked it out without trouble. You can pull the iris away in any direction, on account of its elasticity. The eye has now a vision of 20/40, with one or two opacities in the lens.

I shall merely mention the third case, which was one of injury by shot, because there are others that I wish to speak of in more detail. I have the plate showing the localization of the

shot, which was also localized by the technic that aided us in getting at the foreign body. We found this shot, which had entered through the side, between the eye and the orbital margin and passed inward. It looked as if the foreign body were inside the eye, and yet it was localized by the radiologist as being close to the tunics of the eyeball. I first attempted to go in and see whether it was not in the orbit, but could not reach it. I then enucleated the eye, and found that half of the shot was protruding into the posterior chamber, and half was outside.

Case five was of unusual interest. The patient was struck by a bird shot and it was thought that it had struck the eye, but had not penetrated it. The local physician probed, but discovered nothing. The X-ray showed the foreign body outside the eyeball, in the orbital cavity. It was removed, and the patient made a good recovery. Five months later there were no signs of a scar; the muscle balance was normal and the vision 20/40, which it still remains. If it had not been for the X-ray we should have concluded that no foreign body was present. There were no signs of conjunctival laceration. I probed far back before making the X-ray, and could not discover anything. This case is also unique in that the shot passed around between the two membranes. It made a rent in the conjunctiva and struck the sclera, which deflected it.

The management of foreign bodies requires good judgment, supplemented with clinical experience. Since writing this paper, I have had another case with the shot half way into the eye. I had to enucleate the eye.

DISCUSSION.—Dr. Marcus Feingold, New Orleans, La.: We must acknowledge that factors we cannot account for enter into the lucky or unlucky outcome in these cases. To remove every foreign body that enters the eye may not be so good a procedure as one might think, especially in the case of a bird shot. In New Orleans, we do not enter the eyeball in search of the bullet, unless it actually presents itself. As to the question of sympathetic oph-

thalmia, I incline to the view that there is very little to fear from it. For that reason, we have not been more radical in advocating enucleation.

Dr. H. H. Martin, Savannah, Ga.: I wish to emphasize what has been said about conservative surgery of the eye. With our greater understanding of asepsis at the present day, we can wait much later before resorting to enucleation than we could formerly, with the fear of sympathetic ophthalmia before us. The greatest injury that results from foreign bodies in the eye is infection, and the longer the body remains, the greater is the liability to infection. Therefore, I prefer the use of the hand magnet to that of the more powerful one. The latter requires delay, while the hand magnet can be used within a few minutes. When foreign bodies that are not magnetic are inside the eyeball, they had best be left alone, unless they can be easily removed with forceps, until enucleation is demanded.

Dr. Frank D. Boyd, Forth Worth, Tex.: I wish to report a case of mistake in diagnosis, in the case of a gentleman about thirty years of age. The case looked like one of interstitial keratitis. The history was negative. We kept him under treatment for quite a while. Within ten days or two weeks the eye began to clear up, and I saw in the anterior chamber what was apparently a bright piece of glass. It was easily delivered. The patient then said he remembered that when he was a boy, he had put some powder in a bottle and blown it up. One of the fragments must have gone into the eyeball. It must have been there for nearly twenty-five years. It had given no trouble until a few days before I saw him. He recovered and had normal vision.

Dr. George H. Price: I believe that in cases in which a piece of brass is lodged on the anterior surface of the iris, it will remain there for a long time without giving trouble, just as the piece of glass did in the case mentioned by Dr. Boyd. I have seen a piece that had been there twenty years. When we have removed the foreign body, we have not always escaped trouble. Most

foreign bodies carry with them an infectious agent. If a piece of steel comes from a clean chisel, or from a hammer head that has been struck forcibly enough to sterilize it by heat, you do not have the reaction; but if the piece of steel or iron comes from the gear of a car, locomotive or other vehicle, the chances are that you are going to have pus in the eye, even though the foreign body be removed.

Dr. John O. McReynolds, Dallas, Tex.: The danger of sympathetic ophthalmia is not eliminated by virtue of the presence or absence of any particular kind of foreign body. It is the inflammatory reaction following the injury that determines whether you will have the development of sympathetic ophthalmia. It develops from punctured wounds, and not from foreign bodies, so that the mere fact that a foreign body has been removed does not release us from solicitude concerning the case. If, at the end of ten days, no inflammatory reaction has taken place, we may know that the eye is tolerating the foreign body well. We do not have sympathetic ophthalmia unless there is an iridocyclitis, which precedes every case of sympathetic ophthalmia.

#### Tumors of the Lacrimal Gland.

DR. ADOLPH O. PFINGST, Louisville, Ky. A farmer of forty-eight years applied to me for treatment a year and a half ago, with the history that his left eye had been deviating downward and somewhat outward, and protruding, for a year and a half. On examination, I found half an inch of deviation downward. Rotation was limited upward and outward. The eye showed a good deal of trouble around the disc and some distensions of the veins. His vision had been reduced to 20/200. On palpating the orbit above the eye, we found a mass between the eyeball and the orbital roof, as far as the little finger would reach. On putting the finger to the nasal side, the growth extended out to the external side of the internal angular process. It felt like a mucocele growing down from the frontal sinus. The diagno-



sis of lacrimal gland tumor was made, and operation suggested and carried out, under a general anesthetic. An incision was made through the eyebrow at the orbital edge, going through the middle of the orbit and out to the external angular process; and the growth was dissected out. It could readily be peeled out, although it extended far back in the orbit. It was half an inch long, and weighed three and one-half drams. The wound healed readily, but there remained quite a good deal of ptosis. Later, however, the eye had lifted perfectly. The tumor had a white fibrous capsule. Histologically, the tumor resembled tumors of the salivary gland. The interesting feature of the case is that it was a benign growth of mixed tissue, with no tendency to metastasis. These growths cause death by pressure.

#### **Traumatic Intraocular Hemorrhage.**

Dr. W. G. HARRISON, Birmingham, Ala., reported some clinical observations with especial reference to prognosis and treatment. Cases of traumatic intraocular hemorrhage show that the prognosis is very favorable, even when the condition occurs late in life. There is a great variety of opinion as to the efficacy of various measures in the treatment.

#### **Infection After Elliot Operation Not Always Fatal to Eye.**

Dr. MARCUS FEINGOLD, New Orleans, La. In the first case, a typical picture of panophthalmitis developed. It gradually cleared away, the media became perfectly clear, and no change in the fundus could be seen. The tension was raised slightly. In the second case, a patient with a blind eye was operated on. Four years later, he had inflammation in both eyes. Culture showed *Ameba coli* and *Staphylococcus albus*. A week later, the hypopyon was gone and the media had become clear. He entirely recovered later. Tension plus.

I have compiled a table of cases comprising twenty-four cures, and thirty-one in which the eyes were lost. These teach that late infection need not always end fatally to the eye. It must

be remembered, however, that the figures are incomplete, and that the percentage of cures, if calculated from these figures, would appear to be higher than it would be if we had all the cases. The two cases reported, as well as several instances in the literature, indicate that late infection makes the scar firmer. No statistics can be compiled; and, therefore, no explanation given for the different varieties of late infection manifested in different cases.

#### **Retino-Choroiditis Juxtapapillaris.**

Dr. H. H. MARTIN, Savannah, Ga. Nine males and eight females, of varying ages, were studied. All were well situated economically. Each complained of nebulous vision. Only four complained of pain in the ciliary body. In two of these, iritis was actually present. In thirteen cases, the external eye looked normal. In every case there were opacities in the vitreous. In nine patients the site was exclusively beside the papilla. In every case the papilla was normal. The author believes that the defect originates in the nerve fibers, as the result of their obstruction by inflammation. He isolates four types of these defects. A relapse does not modify the original defect. Every case relapses or will relapse in time. A single acute attack lasts from one month to four months.

The prognosis is good, in a way. The patient sees normally. He still has a field defect, and is sure some time to relapse. The treatment is rest in bed and aspirin. Latent tuberculosis looms up prominently as a cause. For the destruction of nerve fibers, this disease would have to be so extreme that no examination of the eyegrounds would be possible. Enucleation would be a necessity. Not a single patient showed any evidence of tuberculosis, or even of a family taint. No tuberculin tests, however, were made.

The author believes that the problems of the disease are important to solve, and hopes that others will interest themselves in it. He maintains that the name now given it should not be retained, because the inflammation may be in the periphery. He would



term it Jensen's disease. He thinks that infection of some sort is responsible; and that the retina, especially near the papilla is especially sensitive to this infection. One should examine the visual field in every case of choroiditis, especially near the papilla. In his case, the inflammatory focus was central and single, began in the deeper layers, was sharply limited and appeared to follow the course described by Jensen, and the cloudiness of the vitreous persisted long after the inflammation had begun to subside under treatment. Repeated Wassermann tests were negative. The choroidal disease was secondary to the retinal. He wishes to emphasize the necessity for examination of the papilla in every case of retinal and choroidal disease. All possible focal infection should be eliminated.

DISCUSSION.—Dr. John Green, Jr., St. Louis, Mo.: It would appear that the name Jensen's retinitis or retino-choroiditis does not convey to all minds exactly the same clinical picture. Some authors (our essayist included), would limit the appellation strictly to juxta-papillary lesions, presenting the typical field defect. Others do not insist that the lesion shall have this situation, and accept as examples of this disease cases of retino-choroiditis in which the lesion is away from the disc, or even peripheral.

It seems probable that the disease may be regarded as a definite clinical entity; it pursues a well defined course and produces a typical defect in the visual field. There is no reason why solitary choroidal lesions of syphilitic or tubercular origin should not occupy a position adjacent to the papilla, and thus simulate Jensen's retinitis. A careful examination of the field may then be the only means of differentiation; although failure to respond to tuberculin or specific therapy would aid in solving the diagnostic riddle later. Certainly, the course of the disease is typical neither of a tubercular nor of a specific lesion.

Dr. Martin's suggestion that a hidden focal infection may be responsible is worthy of serious consideration.

The acute onset with rapidly developing, fluffy choroidal infiltration and vitreous opacities, bespeaks an inflammatory process of toxic origin. The disease shows a predilection for young adults. The most frequent foci of infection in young people are the tonsils, the nasal accessory sinuses and, in the male, the genito-urinary tract, especially the prostate gland. In view of the probability suggested by Dr. Martin, future cases should have the benefit of a systematic search for infections of this character.

### Repair of the Tarsus.

DR. E. H. CARY, Dallas, Texas. In the few cases in which the repair operation has been done, there has been a distinct lesion, traceable to a definite cause, which has been removed. If you can understand the pathologic changes that have taken place, your operation will be directed to affect these. The only difference between my operation and any of the methods previously employed for entropion is that I have corrected the pathology of the lid. When the cases present pannus, you have already pathologic changes in the tarsus, fascia or orbicularis muscle, as well as in the conjunctiva. I take out the diseased portion of the orbicularis muscle, and squeeze and roll out the indurated masses under the lid, just as is done in an expression operation for trachoma. When the tarsal fascia has become thick and has formed a band, I introduce a spatula under this band and take away the excessive amount of fibrous tissue. I never buttonhole the conjunctiva, unless by accident. In early cases it is not necessary to cut the tarsus.

DISCUSSION.—Dr. J. A. Stucky, Lexington, Ky.: I believe that we have been entirely too radical in our treatment, and I have almost discarded the use of the extraction forceps in cases of this kind. We should examine the nose, and if there is any need of drainage there, attend to it. I believe, with Ziegler of Philadelphia, that the retained matter in the lacrimal sac has often a great deal to do with trachoma. I employ frequent forcible dilatation to

correct this. All cases of trachoma require refraction, and the condition returns if the refractive error is not corrected. I have never tried Dr. Cary's method of removing the orbicularis muscle, but I believe in a thorough canthoplastic operation. I have found better and more lasting results from the use of grattage and trichloracetic acid, than from any other mechanical or remedial agent. I have obtained better results by removing the cartilage than by letting it alone. I think that if we secure a smooth cicatricial surface, that is as much as we can expect in these far advanced cases of trachoma.

Dr. William T. McCurry, Little Rock, Ark.: I have had charge of the blind children of the State of Arkansas for the last three years. At least forty-five of the three hundred children are blind from trachoma, or have that disease in some stage. We dismiss from five to eight per cent cured every year. They are well enough to go home and take up the work in the schools. The unfortunate thing is that the children are sent to me only after they are almost blind. It is a horrible thing for a doctor to allow this kind of thing to go on in a civilized country, and not try to arrest it. There are certain badly infected spots, but it is all over the United States.

Dr. Frank D. Boyd, Fort Worth, Tex.: Dr. Cary lives just across the river from me, and I have many patients on whom he has operated. I know that he has been doing this work successfully for years. It behooves us to take what he says home with us and study it thoroughly. We know that in old trachoma, the tarsal cartilage is bound to be in a diseased condition; and when we have removed the granules and relieved the horrible disease, we have not finished our job. We must remove every condition that is pathologic.

Dr. John Franklin Rowland, Hot Springs, Ark.: I have been talking with some of my colleagues since Dr. Green read his paper, and find that they do the operation that he does for cases of long standing with the cartilage involved. I do the operation as Dr.

Beard does it; but I saw Dr. L. Webster Fox, of Philadelphia, do his different operation, removing the cartilage without the conjunctiva. He thinks that when you leave a smooth margin of cartilage just under the cul-de-sac, you get a better result.

Dr. John Green, Jr.: I have invariably done this work in a very sharp light, and have tried to isolate each individual granulation and express it. The work can be done too gingerly, but one should not be too vigorous in one's expression. I have found excision of the tarsus of the greatest service in cases in which no other measure has served the purpose. I believe in the Kuhnt operation with retention of the fibers, but I have sacrificed the fibers that overlay the tarsus. There has been some shrinkage, but the operation has been satisfactory in cases in which other measures have fallen short of effect. If trachoma were a reportable disease, we could know of its prevalence and introduce measures to control it.

Dr. H. H. Martin: Dr. Cary contends that, in addition to pathologic cartilage you have pathologic tissue over and under the cartilage, including the orbicularis itself. He not only removes the cartilage, partly or wholly, but also all the pathologic tissue. To my mind, he is on the right track. If any operation previously done had given satisfactory results, there would not be so many different operations performed. When I saw Dr. Cary's patients, heard them tell the condition that they had been in before the operation, and saw that they were cured as far as the dreadful results of trachoma were concerned, I became convinced of the value of his procedure. His cases get well. With our old operation of simply removing the cartilage, some patients get well and some do not.

Dr. Cary (closing): Very frequently there is terrific pannus; but the cartilage is not much involved. In that case, I do not sacrifice the tarsus. I take out a little wedge, and try to be sure that I have broken up everything that is contracting. No more than forty or fifty percent of cures have been



claimed for the best operation for this condition so far devised; but I know that I can cure all the cases with this operation. If you do not cure them with this operation, there is some place left that you must fix. Perhaps it is a refractive error. If you do not correct it, they will redevelop the symptoms of a trachomatous condition. On practically all of my cases no one could tell from their appearance seven or eight years after the operation that any operation had been done, provided that there had not been a loss of structure previous to the procedure.

### Trachoma Commission.

A motion was passed that the Chair appoint a commission of five to investigate trachoma and report at the next annual meeting the work done by the various workers in this field, and the following were appointed: Drs. R. H. T. Mann, J. A. Stucky, J. W. Jervey, John Green, Jr., and Marcus Feingold.

### Treatment of Pneumococcus Ulcer of Cornea with the Thermophore.

DR. JOHN GREEN, JR., St. Louis, Mo. No one enters on the care of a pneumococcal ulcer of the cornea without misgivings. I have used various agents in these cases. If, in the course of the treatment, the ulcer extended and hypopyon formed, I did not hesitate to perform corneal section and evacuate the hypopyon. This was a last resort method, however, and last resort measures are not usually productive of very brilliant results. I now wish to report five cases in which I used Dr. Shahan's method of treatment with good results. It is unwise to speak too dogmatically of the value of any new therapeutic method, but I cannot escape the conviction that Dr. Shahan has presented us with a method of great value in the treatment of these cases. It has an exactitude far exceeding that of other therapeutic measures. The only immediately destructive effect is on the epithelium, which is soon replaced. That the infection is checked, is proved by the disappearance of the hypopyon, the stopping of the spread of the ulcer, and the cessation of pain. Anterior

synechias do not have time to form, on account of the quickness of the effect.

DISCUSSION.—Dr. W. E. Shahan, St. Louis, Mo.: These cases reported by Dr. Green constitute the first individual observation on this particular mode of applying corneal thermotherapy. The method was not the result of a happy thought or accident, but was elaborated by a series of animal and laboratory experiments extending over several years. Methods of radiation have been largely failures, because the quantity of heat entering the cornea cannot be controlled or measured. This method differs from others in its exactness. The exact doses of heat are let directly into the cornea through masses, for certain lengths of time; and all the factors are under control.

In applying the instrument, the cornea is first anesthetized. The instrument is heated until the temperature reaches 158° F. Then the instrument is placed in direct contact with the ulcer for one minute. If the anesthesia has been well done, the application is free from pain. The process must be repeated until the whole ulcer has been covered with the heat for one minute.

The mode of action is threefold: First, the destruction of the organisms in the substantia propria of the cornea; second, the direct flow from the surface of the ulcer, pushing out dead leukocytes and bacteria; and third, the formation of a dense leukocytosis, which is what has caused such remarkable freedom from infection in these open surfaces. The results from the use of this instrument have been so constant and unvarying that I begin to feel almost justified in saying that this is the specific treatment for corneal ulcer.

Dr. R. H. T. Mann, Texarkana, Tex.: Many eyes were lost from cataract as the result of the old method of treatment with the electric cautery, due to the overheating of the aqueous humor. I am glad to hear that with a temperature of 158° there is no permanent damage done to the eye.



Dr. Green (closing): It is possible that other types of corneal ulcer than that due to pneumococci may be benefited by this treatment. Dr. Shahan's investigations, however, have been limited to ulcers of that type. Possibly a corneal ulcer from gonococci might be helped by this treatment. There has been nothing tending to confirm the suspicion that cataract might result from overheating of the aqueous with this method.

### Removal of Tonsils for Recurrent Iritis.

DR. M. M. CULLOM, Nashville, Tenn.: We now look on iritis as the result of infection with some form of bacterium. This change in our opinion causes a change in the form of our therapeutic attack. A negative Wassermann having disposed of a specific origin, we make a careful examination for the focus of infection. This having been found and eradicated, there ensues a clearing up of the iritis and a shortening of the course of the disease. I had a patient with recurrent iritis, the attacks usually lasting about six weeks. I had assumed that the iritis was the result of syphilis. He asked me to examine his tonsils and remove them, which I did; and from that day on he has had no attack of iritis. Since then, I have removed the tonsils in two other cases of recurrent iritis, with the result of a cure. I have now had twelve similar cases. Every case of iritis should be rigidly investigated for the source of infection. If one determines that the tonsils are at fault, one should remove them. If the teeth are responsible, remove them and drain the alveolar abscess. The source of infection should be eradicated without waiting for the iritis to clear up.

DISCUSSION.—Dr. John Green, Jr.: We are getting away from the idea that syphilis is responsible for all cases of iritis. We used to be surprised, if we found a case in which syphilis was not the true etiology. Every source of focal infection should be investigated. Dr. Cullom did not mention the genitourinary tract. I am convinced that the posterior urethra and prostate contain

infection that is responsible for iritis attacks. Unless you determine the etiologic factor, empiric therapy will not carry you very far. It is only when you have eradicated the focal infection that you get permanent cure.

Dr. Robert W. Bledsoe, Covington, Ky.: It is my belief that an iritis that is purely local does not exist, except when it is of specific origin. I have many times removed badly diseased tonsils with the result of curing iritis. I experimented, to see whether the tonsils were responsible for the iritis in such cases, in the following way: I squeezed the juice out of the tonsil as well as I could, and sprayed the throat well with an alkaline solution. Then, with a probe dipped in tincture of iodine, I went into each crypt that I could find. In several cases in which I carried out that experiment, I found the iritis to disappear under a placebo in place of the usual medication. I then removed the tonsils.

Dr. Eulany, Madison: Syphilis is rarely the direct cause of iritis. It is more of a predisposing cause, a condition that lowers the vitality and makes the individual more susceptible to infection. I had one case of iritis that was positively due to a chronic gonorrheal infection, urethral in origin. The only way in which we could clear up this iritis was by use of autogenous vaccines. I had one case due to an infected maxillary antrum, the infection being streptococcal in origin. We have not been able to find the cocci that produce the majority of the conditions. The tonsil is productive of most of the cases, but you often find skin conditions responsible. I wish to report having a case of gall bladder infection associated with iritis.

We may find the main focus of infection in any part of the body. The thing to do is to study the patient from head to foot. The ophthalmologist should associate himself with an internist who will take the time and trouble to make careful examinations of all patients. Infection often travels up stream in the lymphatic circulation; and in the phlyctenular infection associated with these cases, the infection is carried

through the lymph to the tissue itself. The appendix is, next to the gall bladder, more frequently infected than any other part of the body.

Dr. H. H. Martin: When I was a student, we were taught that there were only two kinds of iritis, syphilitic and rheumatic. Now we know that while there are a few cases of syphilitic iritis, they are so different in character from other cases of iritis that they may almost be diagnosed without a Wassermann.

Dr. Cullom, closing: It is remarked that a man of such wide observation as Dr. de Schweinitz should have made the statement that seventy-five per cent of all cases of iritis are due to syphilis. I think Dr. Bledsoe's plan is very clever. While I approve of autogenous vaccines, I cannot but think that when you have eradicated the foci of infection, the circulation will take care of any infection remaining; so that the autogenous vaccines are not so important as some of us have been taught.

#### Officers for 1918.

The following officers were elected by the Section: Chairman, Dr. E. J. Cary, Dallas, Tex.; Vice-Chairman, Dr. J. A. Stucky, Lexington, Ky.; Secretary, Dr. W. T. Patton, New Orleans, La.

LULU GAY, Reporter.

#### CHICAGO OPHTHALMOLOGICAL SOCIETY.

November 19, 1917.

DR. PAUL GUILFORD, President, in the Chair.

#### Ocular Manifestations of Reflex Origin.

DR. B. F. ANDREWS said that ophthalmologists are familiar with the many intra- and extraocular phenomena arising from purulent processes in the nose and its accessory sinuses. The literature bearing upon this phase of ocular disturbances is quite profuse. He called attention to another group of ocular disturbances due to extra-orbital conditions nonpurulent in character, regarding which the literature is more scant.

He referred to that rather numerous class of cases which well nigh exhausts the patience, and baffles the skill of the ophthalmologist, to properly correct with glasses that can be worn with satisfaction for any considerable length of time. These patients came to the ophthalmologist after having passed through the hands of refractionists of repute; had been examined under mydriasis and without; had been refracted with cycloplegics and without. They also bring as proof an assortment of glasses that had been prescribed, each worn with comfort for a time, only in turn to be rejected.

Another group of cases, coming under the same general class is composed of those who, for some defect or other, wear glasses which are comfortable until some operation, or other disturbance involving the distribution of some branch of the trigeminus nerve has supervened. After such an operation, some of these cases discard their glasses altogether, while others are compelled to seek relief in new lenses for the correction of error, differing in kind or degree, from that which existed before.

The cases cited above are of such numerical importance that a satisfactory explanation for their occurrence should be sought, and, if found, doubtless would be welcomed by all. A study of the limited number of cases coming under the author's observation has indicated that the majority are accommodative disturbances, while some appear to be truly refractive. But whether accommodative or refractive, the ciliary muscle acts and reacts as the result of some stimulus applied outside the eye itself. In the normal individual this stimulus originates in the brain, and manifests itself in perfect vision through a crystallin lens of proper curvature, made so by the action of the ciliary muscle. In the nonaccommodative eye, on the other hand, this stimulus must arise outside the domain of the will, resulting in imperfect vision through a lens of improper curvature, made so by the action of the ciliary muscle.



Muscular movements may be classified as follows: Voluntary, involuntary and reflex. Voluntary muscular action is under the control of the will. Involuntary muscular action is under control of the sympathetic nervous system. Reflex muscular action is brought about by the impulse produced by a stimulus applied to a sensory periphery, traveling through a ganglion, where it is switched onto the motor nerve supplying the muscle. The course over which this reflex impulse travels is called the reflex arc.

Without going into a minute review of the trigeminus nerve, its roots, its three main branches and its numerous endings, the author pointed out the components of the reflex nerve tract reaching the ciliary muscle. Following back the numerous motor nerve filaments that supply the muscle, the ciliary ganglion is reached, situated behind the eye and within the orbit. This is made up of three roots, each carrying its own kind of nerve impulse; a motor from the motor oculi, a sympathetic from the cavernous plexus and a sensory from the ophthalmic division of the trigeminus, together with a root communication with the sphenopalatine ganglion, capable of carrying reflex impulses.

The oculomotor supplies all the extrinsic muscles of the eye except the superior oblique and the external rectus, while the ciliary ganglion supplies the intrinsic, namely, the ciliary and the sphincter of the iris. The sphenopalatine ganglion is made up of three roots; a motor from the facial, which unites with a sympathetic root from the carotid plexus to form the vidian, and a sensory from the maxillary division of the trigeminus. This ganglion is also connected directly with the otic ganglion by a root communication, besides the communication with ciliary ganglion, referred to.

The sphenopalatine ganglion receives sensation from all parts of the interior of the nose except a small area on the lateral and septal walls anteriorly. A line of nerve communication, then, is established between the nasal cavities and the ciliary muscle, forming

a reflex arc, having as its components the sensory filaments in the nose, the sphenopalatine ganglion, the interganglionic line from the sphenopalatine to the ciliary, the ciliary ganglion, and lastly the motor nerve filaments to the muscle.

Having this reflex arc, is it not fair to assume that reflex impulses may reach the intraocular muscles and influence them in the disturbance of vision? May it not be possible, or even probable that irregular contraction of the ciliary muscle may result in distortion of the lens, and in the production of lenticular astigmatism? In fact, may not any erratic action on the part of the ciliary muscle be attributed to some irritating cause outside the eye? If such be the case, it behooves us as ophthalmologists to institute a thorough search for the source of irritation wherever it may be.

The question of peripheral localization has not as yet received the attention that it deserves. But if the reflex hypothesis is correct, the source of irritation ought to be found in some area whose sensory filaments center in some ganglion, where some of these filaments arborize around motor cells whose axis cylinders reach the disturbed muscle. As no sensory nerve filaments from the eye pass into the ciliary ganglion to make up a reflex arc, the irritating cause would hardly be looked for in the eye.

The ganglion next in course is the sphenopalatine, whose sensory distribution is the mucosa of the turbinates and meatuses on the lateral walls of the nasal cavities, and that of a corresponding area on the septum. It goes without saying that these regions should be examined with minute care for any irregularity that may be the cause of the disturbance.

In those cases coming under the author's observation, these intranasal areas have been the seat of by far the greater number of irritative conditions producing these varying ocular symptoms, and when found and properly removed, glasses then adjusted to the eye conditions present remain indefinitely satisfactory. The author is convinced,



therefore, that these eye manifestations should be regarded as symptoms pointing toward the underlying cause.

**DISCUSSION.**—Dr. Frank Brawley cited a case in connection with Dr. Andrews' paper, although it did not follow the reflex arc through the sphenopalatine ganglion. Many examinations of the eye had been made and many different pairs of glasses had been ordered, and when he saw the case he was not able to find the refraction essentially different from the number of pairs of glasses which the patient had formerly tried. In making the nasal examination X-ray pictures were made of the sinuses which were found negative, but accidentally an impacted wisdom tooth was found and when all teeth were filmed there was an impacted wisdom tooth in each lower jaw. When these were removed there was no further need for glasses or any eye treatment.

Dr. E. V. L. Brown asked Dr. Andrews if he had seen any cases of genuine spasm of accommodation that could be attributed to such irritation through the nose; vision had been previously established to be normal, and then suddenly the patient developed apparently a myopia of from one-half to two or three D., which could be promptly corrected with a minus one or minus two glass, as the case may be; then under atropin the spasm could be relieved, but after the atropin had been stopped the spasm would return. Is there any definite relation between these cases and accessory sinus disease? Dr. Brown had seen five such cases in the past year, but had not been able to find any cause for them.

Dr. Oliver Tydings cited a case that came under his observation years ago. A piano manufacturer came to him with an ulcer of the cornea. Examination showed that a canaliculus on the same side as the ulcer of the cornea had been split up, while in a hospital in Copenhagen where he spent three months fifteen years before; and there was the scar of an old ulcer of the cornea of that attack. The patient had been under the care of another oculist for some weeks, without any improvement. In making an examination for

other possible sources of trouble the middle turbinal on that side was found very much hypertrophied. He advised the patient, if the eye did not improve, to have the middle turbinal removed as that was undoubtedly the source of the trouble. After a few days, no improvement taking place, the eye becoming progressively worse, the middle turbinal was removed. In twenty-four hours there was a marked improvement and the ulcer healed in a week.

Dr. Andrews, in replying to Dr. Brown, said that he had not had a case of spasm of accommodation that could be overcome under the influence of cycloplegics.

### **Narrowing of Pupil Does Not Lower Normal Intraocular Tension.**

DR. ANDY M. CARR read a paper on this subject in which he reported 100 cases from the Research Laboratory of Cook County Hospital. These observations were made to determine whether or not there is a lowering of normal intraocular tension when the pupils are made smaller. The necessity for determining this matter arose from routine clinical work on three different types of cases. First, borderline glaucoma cases. In these cases the author dealt with slightly enlarged pupils, suspicious cups, inconclusive narrowing of the fields, and a tension above say, 25 mm. Hg. It was often noted that there was definite lowering of tension after a miotic, while at other times there was no change.

2. Definite high tension, simple glaucoma in one eye, with tension well within so-called normal limits in the other eye. The tension frequently fell in this second eye, although in some cases it remained unchanged after miotic. (Story.)

3. Acute inflammatory glaucoma in one eye with normal tension in the other eye unaffected by narrowing of the pupil. (Field.)

It is evident that in these types of cases it is of prime importance to know whether or not normal tension is reducible by miotics.

The material consists of 100 cases studied at the Cook County Hospital.

They were patients that gave no history of eye trouble and were not seriously sick. Their ages ranged from 12 to 67 years. Only cases in which satisfactory tonometer readings could be made were used.

As in a previous series of cases, all tension readings were taken with the Schiotz tonometer, and holocain in 2 per cent solution was used as an anesthetic. The size of the pupil was first noted, then the tension taken. One-half hour later the tension was again taken. The pupils were then rather quickly contracted with eserin salicylat in one or two per cent solution. The average size of the pupils after the miosis was one and a quarter mm. All pupils were contracted to at least 2 mm. Holocain was again instilled and the final tonometric readings taken.

In no case was there a lowering of tension following the contraction of the pupil greater than 3 mm. Hg. This amount is well within the recognized limits of error of observation in the use of the tonometer. There was in no case any difference between the first and second readings before the miosis.

Following the use of the eserin many patients complained of diminution of vision and headache; a few of them complained of pain within the eyes; a few became nauseated, while four or five vomited. The pupils remained contracted a variable length of time—in a few eyes as long as 72 hours.

From this series of 100 cases the author concludes that intraocular tension in normal eyes is not to be lowered by the narrowing of the pupil. The corollary of this statement, namely, that a decrease of intraocular pressure following the use of a miotic necessarily means that an eye is glaucomatous, is not even herewith postulated and does not properly come within the scope of the paper. The author verified the statement frequently made, namely, narrowing the pupil does not lower normal intraocular tension.

#### Unilateral Exophthalmos.

DR. OSCAR DODD reported a case of proptosis which was first noticed on

the 4th of July by the patient. The eye was proptosed fully 5 millimeters, with no other symptoms whatever. At first, he thought it might be a case of exophthalmic goiter showing in one eye, but all symptoms of Graves' disease were absent except the proptosis. After going into the history of the case he found that about a month before this was noticed the boy was hit on the side of the head quite a severe blow with the flat of the hand, causing considerable trouble with the ear on that side for two or three weeks. There are cases of proptosis due to an interference with the sympathetic, but it has never been the author's privilege to see unilateral proptosis after such an injury. He has not had time to look up the literature and has not fully concluded as to the cause of the condition. If any of the members had had experience with such cases and could throw any light on the subject, he would be very much obliged to them. There is no muscle disturbance. Vision and motion are normal, and there is nothing except the proptosis, which is less after having the eye closed at night.

MAJOR H. WORTHINGTON,  
Secretary.

#### COLORADO OPHTHALMOLOGICAL SOCIETY.

December 15th, 1917.

DR. GEO. F. LIBBY, Presiding.  
Sclero-corneal Tuberculosis.

DR. J. A. McCaw presented Mrs. D. S., age 35. O. D. lost with some inflammatory disease, and was finally enucleated by Dr. Coover. July 26, 1917, she came to the university clinic with a badly inflamed eye, lacrimation, and photophobia. Examination showed a zone of redness around the sclero-corneal margin. At the temporal border of O. S. was a nodule about the size of a bean, elevated above the sclera, and extending into the cornea about 1 mm. The sclera had a decided bluish cast. The Wassermann was negative. The patient was put on 10 gr. K. I. t. i. d.; then in two weeks a second Wassermann was made which was + 2.



Specific treatment was pushed, by mouth and by inunction, but the eye grew steadily worse. Then a von Pirquet test was made and was strongly positive. She was given bacillen emulsion, with steady improvement until the present, when the nodule has disappeared. Dose: B. E. 2/200 cc. to 8/10 cc. Atropin was used locally.

DISCUSSION.—Dr. M. Black asked if she had any general reaction following the administration of tuberculin, to which Dr. McCaw answered in the negative, but he said she had a slight focal reaction at times. Dr. Black suggested a larger dose for the general reaction in order that the therapeutic treatment may be governed by the general reaction and the doses kept just below the point which will produce a general reaction. After several months she should again be given enough tuberculin for the general reaction, in order to determine the necessary doses from time to time.

Dr. E. R. Neeper asked why the Wassermann hasn't been followed up to see if she reacts to the Wassermann test now. He believed that she should be treated for both lues and tuberculosis in order that she may be able to give a negative Wassermann.

Dr. McCaw, replying to questions, said the patient did not give any history of miscarriages, nor did her children show any evidences of congenital lues. She had not been examined for evidence of pulmonary tuberculosis.

Dr. H. R. Stilwill said she had involvement of O. D. in the university clinic several years ago. At that time the sclera was very thin, and looked as if it would rupture at any time. Dr. D. H. Coover suggested enucleation of O. D., which was duly performed.

#### Primary Optic Atrophy.

DR. H. R. STILWILL presented Master K. G., age 8. First seen Dec. 8, 1917. He is a bright and rugged boy; in the third grade of school; youngest of five children; all healthy. Mother thinks he has always been "near sighted." Recently received notice from school authorities on account of poor vision.

V. O. D. =  $4/20 + 1$ . V. O. S. =  $4/15$ . R Atropin for refraction.

Ophthalmoscope: Both nerve heads white, more marked in O. D. Choroidal ring distinct and broadened; nutrient vessels on disc faint; not much change in veins and arteries, but they are diminished in number. Degenerative changes in retina; more marked in macular region. Fields contracted for form and color. Wassermann blood test positive.

DISCUSSION.—Dr. E. Jackson believed syphilis probable in this case. The changes in the nerve head, retina, etc., as well as the positive Wassermann, all indicate lues. He believes congenital syphilis often runs its course in very early childhood, before the children are seen by an ophthalmologist. It seems apparent from this child's fundi that the disease had probably run its course, and that the fundi will show very little, if any, change later on.

Dr. M. Black said he feared a keratitis later on. He would seriously consider this, and administer prophylactic treatment. He believes there is some organized exudate on the nerve head and that this is not typical primary atrophy of the disc.

Dr. W. H. Crisp said aside from the atrophy of the disc this case is not very typical.

Dr. E. R. Neeper stated that Dr. Friedman had presented a woman before this society several years ago whose fundi were much like the child's. She had vision of 20/20 at that time. The members were doubtful about the diagnosis with such excellent vision. However, the fields were slightly contracted.

Dr. G. F. Libby asked how much dependence we can put in the Wassermann test. If we can depend upon it, we should treat and prevent lues in the future.

#### Traumatic Dislocation of Lens.

DR. M. BLACK presented a man, age 30, who gives a history of having been struck in O. S. with a board, on Jan. 26, '16. He was taken care of at the time by Dr. C. E. Walker. The inter-



esting feature of the case is that the lens has been dislocated and the closest examination on Dr. Black's part revealed no evidence of its location. The media are clear. There is considerable atrophic looking matter, pigmentation, immediately below the disc. The probabilities are that this was occasioned by a rupture of the choroid in this situation at the time of the injury; and that hemorrhage followed, which subsequently organized, leaving the present appearance.

DISCUSSION.—Dr. Matson said this injury occurred early in the morning. The patient was cut on the lower lid, and probably there was a scleral rupture, but none was found. There was a decided hemorrhage into the anterior chamber and vitreous. A piece of iris was floating in the anterior chamber. Atropin was used, but there was no pain.

Dr. Walker confirmed these observations by Dr. Matson, regarding Dr. Black's patient. Dr. Walker said there was such an extensive hemorrhage of the whole eyeball that it was impossible to see any of the details of the fundus. This was eventually absorbed. The lens was not found.

Dr. W. H. Crisp inquired if the atropin had been used for any length of time and was answered in the affirmative. He said he asked this because recently he saw an elderly Jewish patient who had been struck in the eye with a piece of wood. Atropin was used, but a few days later the tension was elevated; there was pain, redness, etc. The atropin was immediately stopped and eserine used. Ten days after the injury he found the lens in the vitreous chamber.

### Result After Cataract Operation.

DR. M. BLACK presented a woman upon whom he had operated September 27th, 1892, for a cataract in O. S. She was then 40 years of age. O. D. was normal in every particular. The left pupil was very conspicuous for the lens was very white. He performed a simple extraction. The cosmetic result is perfect. She came to the clinic a few days ago complaining of visual

failure of the other eye and upon examination he found advanced lenticular changes. He found the refraction of the aphakic eye to be  $+13.00 \text{ C} + .50 \text{ Ax}$ .  $120^\circ$  with resulting vision of 20/30. The fact that this eye could go 25 years, and suddenly resume almost its normal visual power when corrected by a lens, was very interesting to him. He was inclined to think that had he not operated upon the eye it would today be a useless organ and probably diseased.

DISCUSSION.—Dr. W. H. Crisp spoke of a case of congenital amblyopia of one eye and high myopia of the other eye. This patient obtained good vision in the myopic eye with the correcting lenses. He stated that sometimes one obtains better vision for a patient than he expects in one case, and not as good as one should expect in another. He further stated that in Dr. Black's patient the eye has been straight all these years and there has been a retinal image on the macula, even though it is blurred in the aphakic eye. This tended to keep up the function of the retina, so there would be normal vision with correcting lenses.

### Steel in Orbit.

DR. F. R. SPENCER presented Master R. P., age 5. Struck in O. D. with a small piece of steel Dec. 7th, 1917, while his father was striking the blade of an axe with a hammer.

The piece of steel entered the limbus at the inferior nasal quadrant, and passing through the iris, vitreous and sclera, lodged in the cellular tissue of the orbit, 2 or 3 mm. internal to and about 3 mm. above the optic nerve. The foreign body measures 1 by  $3\frac{1}{2}$  mm. in size, and is undoubtedly magnetic.

When examined 36 hours later, the anterior chamber had reformed, but the wound of entrance was very much in evidence as it is now. The examination of the fundus was very unsatisfactory, as the vitreous was full of blood. It was impossible to see any details in the fundus. Dionin and atropin have been used.

December 15th, 1917, V. O. D. can recognize hand, but can't count fingers. V. O. S. 6/7.5.

**DISCUSSION.**—Dr. M. Black said the foreign body in this patient is probably lodged in the retina near the posterior pole or possibly in the choroid or sclera. He has never seen a foreign body penetrate all the tunics of the eye when a piece of steel or iron had struck the eye, despite the X-ray findings to the contrary. He said that a bullet might easily penetrate all the coats of the eyeball, but splinters of steel and iron in his experience had not.

Dr. E. R. Neepier replied that he had one case in which a foreign body passed entirely through the eye and lodged in the orbit.

Dr. E. Jackson said one X-ray test is almost positive. This can be made by having the patient look as far down as possible while one exposure is made on the X-ray plate, then have the patient look as far up as possible while the second exposure is made on the same plate. In all probability if the foreign body is lodged in the orbit it will not move during this procedure, but if it is lodged at any point in the posterior pole of the eyeball, the X-ray plate will show two positions of the foreign body. He further stated that we should make some allowance for the divergence of the X-rays and the size of the eye in mapping out the foreign body.

Dr. W. C. Bane spoke of the X-ray locating the foreign body in the vitreous in one of his cases. He removed the particle of steel and the patient now has normal vision.

#### **Traumatic Choroiditis and Probably Hemorrhage Into Vitreous.**

DR. G. F. LIBBY presented a man, first seen today, age 45. This patient showed a large circular area of choroidal atrophy with pigmentation on the nasal side of the left disc, with a similar triangular patch adjoining the lower temporal quadrant of this nerve head. The latter seemed like a coloboma produced by choroidal rupture. The patient had received a blow over O. S. at 10 years of age; and, at 15, noticed floating bodies before this eye, with gradual loss of vision. At 17 he contracted syphilis, for which he took protoiodid of mercury faithfully for 3

years. Syphilitic manifestations in 1903 led to 2½ years' treatment with mercury and potassium iodid. No further signs of activity of the disease occurred until June, 1917, when the vision of O. D. dropped in one week, from normal to bare ability to go about unaided. This condition persisted for 5 months, after which the sight gradually returned to normal in 3 weeks' time. From the failure of vision until its return, ¼ grain of mercury protoiodid was taken t. i. d. Its continued use for 1 or 2 years was advised; with Wassermann reactions and the use of salvarsan on the first appearance of active manifestations of syphilis. Because the fundus of this eye was entirely normal, and from the character of the loss and restoration of vision, a diagnosis of probable hemorrhage into the vitreous seemed warrantable.

**DISCUSSION.**—Dr. M. Black said this patient is far from being over his syphilis. He should have very active treatment.

Dr. E. R. Neepier said he depends upon the Wassermann test a great deal. He would have this man treated for a time; have a second test made and be governed by it. He would treat him vigorously until the Wassermann is made, and then attempt to keep this test negative by occasional treatment from time to time as the Wassermann shows that it is or is not needed. He allows his patients to marry after prolonged treatment and several negative tests.

Dr. F. E. Wallace suggested the advisability of a spinal fluid Wassermann in many cases.

Dr. E. Jackson spoke of the lesion with recovery in six months. He thought this was rather a short period of time for recovery. He said optic neuritis may run 6 months to 1 year with good vision; however, the vision fluctuates a great deal. He stated this patient's poor vision may have been due to slight vitreous hemorrhages as a result of lues.

#### **Traumatic or Infectious Conjunctivitis.**

DR. D. A. STRICKLER reported a case of conjunctivitis in an imbecile child,



aged 10, in an institution of Denver. When first examined there was slight redness of the eyeball; the next day there was a great deal of swelling; and, in 3 hours, profuse discharge. In the lower cul-de-sac he found exudate, which was adherent to the ocular conjunctiva, with bleeding after its removal, and pus in the lower cul-de-sac. Microscopic examination of this failed to reveal diphtheria bacilli, but it did show streptococci and diplococci. There was decided chemosis of the ocular conjunctiva with pronounced edema of the lids. There was a pin head corneal lesion near the lower limbus. Atropin was used and the swelling subsided, but the cornea became rather hazy over the lower half. Dr. Strickler suspected that some escharotic might have been put in the eye by the child or by some other inmate of the institution. But it was impossible to find any evidence of this, and the superintendent insisted that all such things were kept where the mentally defective children could not, by any possibility, get hold of them. The possibility of trauma was also considered. There was no evidence of exudate on the upper or lower lid, as the lower part of the ocular conjunctiva was the only part involved.

DISCUSSION.—Dr. M. Black said the diplococcus of pneumonia may produce this clinical picture.

Dr. W. C. Bane said it was very suggestive to him of trauma.

#### Probable Retinal Tuberculosis.

Dr. F. E. WALLACE reported of a man of 33, railroad employe, seen 2 weeks ago, with a history that he lost his vision rather suddenly in O. S. V. O. D. 20/20 and V. O. S. 20/200. Examination of the disc showed this to be very hazy, and elevated 2 to 3 mm., so that the outlines were almost entirely lost upon one side. The veins on this side were unusually large, although the arteries were negative. Edema was so marked that it obscured some of the vessels and there were small hemorrhages about the disc. Internal to the macula there were white spots which were round, and there were

20 to 40 of these. Vision was reduced to hand movement. The urine was negative and the history of lues was negative, but he admits exposure often. Blood pressure 130. He had a negative Wassermann 2 years ago. He states that he has had no headache and that his eye is free from pain. The temporal half of the eye is worse and the nasal half is nearly normal.

DISCUSSION.—Dr. E. Jackson said swelling of the veins, exudate, and white patches are all suggestive of tuberculosis of the retina. He has a case very much like the one Dr. Wallace has just reported. The patient has been examined very carefully by Dr. C. N. Meader, and has unquestionably been tuberculous in the past.

Dr. W. H. Crisp said the blood pressure might be normal, yet the patient may have advanced arteriosclerosis.

Dr. G. F. Libby spoke of a man, age 73, whose retinal vessels were negative 3 months ago when Dr. Crisp examined his eyes. They were also negative 2 years ago, when Dr. Libby examined them. Recently, one retinal vessel showed very marked beading in the upper temporal quadrant and another had a hemorrhage. The urine was negative one month ago.

Dr. M. Black confirmed Dr. E. Jackson's remarks. Dr. Black said Dr. Wallace's patient may not show other evidences of tuberculosis, yet he may have retinal tuberculosis.

FRANK R. SPENCER,  
Secretary.

#### WILLS HOSPITAL OPHTHALMIC SOCIETY.

Meeting November 5, 1917.

DR. MCCLUNEY RADCLIFFE, Chairman.  
**Congenital Cataract.**

Dr. P. N. K. SCHWENK exhibited a case of congenital cataracts, in a baby boy, in which he removed the lens from each eye. One eye was operated upon at the age of 11 months and the other at the age of 14 months. Attempts at dissection failed owing to extreme toughness of lens capsule. He, therefore, opened the anterior chamber by means of a keratome, grasped the an-



terior capsule with iris forceps, and delivered the lens in its capsule. Recovery was prompt. Two months later the left eye was treated in a similar manner, but the capsule tore and some cortex remained in the anterior chamber. The recovery was uneventful. Before the operation there was a divergent squint O. S., but at the age of 16 months he ordered a + 8.00 D. lens for each eye and, when worn, the visual axes were parallel. This is the youngest child he has ever glassed.

At the present time the left eye shows an occluded pupil and a bowed iris due to an accident after leaving the hospital.

**DISCUSSION.**—Dr. Wm. Zentmayer said: "While this particular case, exhibited by Dr. Schwenk, admits of no other operative procedure than that employed, the left eye illustrates what may, and often does, occur following the operation of linear extraction of juvenile cataract. Here the result was good in one eye, but in the other eye the adhesion of the iris to the wound was extensive and has produced an inflammation which has rendered the eye visually useless. There is no question of the far greater safety of repeated dissections."

In reply to a question of Dr. Kleinhans, Dr. Zentmayer said that he thought the operation should be done early, about the second year.

### **Tumor of Antrum—Cataract.**

—DR. ZENTMAYER exhibited, from the service of Dr. Chance, a woman 60 years old, who had recently noticed a bulging of right eye preceded by nose-bleed. There was a firm ridgelike palpable mass just within the inferior orbital margin. There seemed to be slight bulging of internal process of frontal bone on same side. Movements of the globe were somewhat restricted downward and outward. The fundus could not be examined because of immature cataract which also prevented testing the visual acuity. The patient had just been admitted and was shown for diagnosis. Probably a malignant growth in antrum.

Dr. Zentmayer showed, from service of Dr. Chance, a girl with symmetric lenticular opacities in anterior and posterior cortex limited to one-eighth circumference of perinuclear zone. They were probably of the zonular type.

### **Coloboma of Lids.**

DR. WM. CAMPBELL POSEY presented a case of bilateral coloboma of lower lids. The notch in the right eye occurred at junction of middle and outer third, in the left eyelid at junction of middle and inner third. Both superior maxillary bones showed faulty development, in consequence of which the right side of mouth was drawn markedly upward. The inner halves of both upper lids exhibited colobomatous tendencies, the lid margins in this position being drawn upward in a sweeping curve with its convexity downward. Dr. Posey had corrected the fissure in the right eyelid by a plastic operation. His colleague, Dr. John B. Roberts, of Polyclinic Hospital, had corrected the deformity at angle of mouth. The coloboma in the left eyelid, which was complicated by symblepharon and marked retraction of the tissues in that region, had resisted correction at the first operation. Dr. Posey said he had another in mind which aimed at correction of the deformity by transplantation of a flap of skin from the root of the nose into the colobomatous area.

### **Shot Injury.**

DR. PAUL J. PONTIUS presented a case of a boy, 15 years old, who was struck with a shot from an air rifle. The shot struck the sclera of right eye about 10 mm. to outer side of cornea. The accident occurred ten days ago. Patient was first seen 22 hours later. At this examination nothing was seen but the external injury to sclera, which showed as a circular area of hemorrhage 2 mm. in diameter. Eight days later, bulging occurred over this area. Today the fundus shows a patch of choroiditis beneath the site of scleral wound. The surrounding choroid shows some deep effusion and is slightly elevated. There is, however, no retinal detachment. The disc shows minor early optic neuritic changes.

# American Journal of Ophthalmology

Series 3, Vol. 1, No. 2.

February, 1918

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to

H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

## EDITORIALS.

### THE AMERICAN JOURNAL OF OPHTHALMOLOGY.

The consideration that so large a country as the United States of America should be represented in the world's ophthalmic literature by more than one quarterly publication (*The Archives of Ophthalmology*); and that almost every weekly or monthly general medical journal published in the United States contained, in most of its issues, one, or sometimes several articles on ophthalmic subjects; and that it probably was the general desire among ophthalmologists to have such papers united in one special monthly publication,—was what urged me to found such a journal.

The head of the publishing house of J. H. Chambers of St. Louis was willing to undertake the publication. He was undoubtedly prompted to this action, as later became more and more apparent, and as was for him but natural, by purely commercial considerations. I in my—may I say—youthful enthusiasm, did not desire any gain

whatever, but only hoped to be able to serve ophthalmic science by means of this journal, and to get into and keep in closer contact with the men devoted to scientific work in our specialty.

At that time, a number of journals in other specialties had made their appearance with the name of "The American Journal" of this or that, and I considered it best to name this new journal the *American Journal of Ophthalmology*. I hoped thereby to appeal more strongly to the ophthalmic working and reading public of the United States. That about two decades previously a journal by the same name had been in existence, I was at this time absolutely ignorant of.

The thing to do was, of course, to get a number of representative ophthalmologists to promise their literary support. Right here my ardor received its first rebuff. A few of the gentlemen thus addressed answered cheerfully and promptly in the affirmative. Most of these have been staunch supporters of the journal to their death, or to its recent merger with the younger ophthal-

mic journals. Some, however, thought the idea preposterous for me to try to publish an ophthalmic journal in the western part of the United States and so far from the seats of learning. Some could not understand what good such a journal was to do to ophthalmology. Some were kind enough to remind me that such an undertaking would be very costly, and that I probably would be unable to keep it up. Some actually never answered my letter.

That so much cold water thrown on my proposition somewhat cooled my ardor, was but natural. When, however, I considered the list of the gentlemen who had promised their support, and furthermore, when I received a letter from a well known ophthalmic worker in a western city which started with the words: "Hurrah! for you to have the courage to start an ophthalmic journal west of the Alleghenies," I took fresh courage, and in April, 1884, the first number of the *American Journal of Ophthalmology* made its appearance.

The following explanation of its origin and of the ideals which in my opinion were to guide it, was published with the first number:

"Although a very large number of ophthalmologists are practicing on the American continent, the results of their scientific researches and practical experiences, have thus far, either remained unpublished, or have been more or less lost to their professional brethren by being published in general medical journals.

"The only medium of which for a number of years the American writer on ophthalmic subjects could avail himself, the *Archives of Ophthalmology*, is issued only quarterly, and from their international character, they afford only comparatively limited space for American writers.

"To give the American ophthalmologists such a medium for communicating the results of their scientific researches and their clinical experiences to their professional brethren, the *American Journal of Ophthalmology* is intended.

"Its principal object shall be to give a full representation of the scientific work of American ophthalmologists, and to form a record of each step in the advance of ophthalmic knowledge made by American writers. In order to reach this aim, a number of American ophthalmologists of high standing have been asked for, and have promised their support to this journal."

Considering the conditions then existing, the Journal was well received. Soon, also, numerous papers were contributed from known and unknown sources. But alas, the fate of an editor was soon made clear to me, when I was forced to return quite a number of manuscripts as unfit, and when one author who absolutely desired his name and paper to appear in print, returned it to me with the bribe of a ticket to the County Fair and a number of chances on some farm machinery! Space would lack if I should undertake to relate all my partly distressing, partly comical experiences. Suffice it to say, that I tried to preserve the character of the journal, in spite of all vicissitudes. The latter were in a great measure due to the publisher, whose whole interest seemed to be to make as much money out of the publication as possible. In spite of my ardent protests, the list of advertisements accompanying the journal grew very large, and many were of a character which greatly offended me. But my hands were tied. Made desperate, I finally told the publisher that I refused further to conduct the Journal, but if he would name his figure, I would buy him out. He did so, and with the beginning of 1896, I became the sole possessor of the Journal. Beginning with that year, I changed the size of the page of the Journal, and gradually got rid of the commercial advertisements. What the latter means to a journal of limited circulation, almost every one can figure out. It took some courage, but it was worth while.

In order to improve the scientific value of the Journal, I had to have some help, as my time grew very limited. Dr. J. Ellis Jennings kindly accepted the position of Assistant Editor. He was succeeded in this office by Dr.



W. A. Shoemaker, in 1900; Dr. J. F. Shoemaker, in 1909; and Dr. W. F. Hardy, in 1914. The work of these gentlemen added greatly to the efficiency of the Journal, and made the work easier for myself.

It is a truism, that nothing in this world is perfect, that the ideal is a thing we can never reach, or it would no longer be an ideal. The Editor of a journal is, perhaps, in as good a position to perceive the truth of these sayings as any one else. Certainly, it has been my experience. Yet, in spite of all adversities, the *American Journal of Ophthalmology* has lived, and I believe, fulfilled its mission, thanks to the many loyal supporters, who, now that it is defunct, will, I have no doubt, transfer their goodwill and loyalty to the new AMERICAN JOURNAL OF OPHTHALMOLOGY.

ADOLF ALT.

## THE ANNALS OF OPHTHALMOLOGY.

### A RETROSPECT.

"The King is dead! Long live the King! After years of faithful attempt to serve the medical profession and to mirror for the benefit of those laboring in the field of Ophthalmology the progress of their specialty, the *Annals of Ophthalmology* has ceased to exist, or rather has combined with other ophthalmic journals to form the new AMERICAN JOURNAL OF OPHTHALMOLOGY, as the river gathers to itself and merges with other rivers to form a mighty stream that sweeps on to the sea, to mingle its waters with that from all other sources. May its valedictory be the salutatory of a new era, where the seeds sown in the past may ripen into a more glorious fruition.

In 1892 Dr. James Pleasant Parker of Kansas City, Mo., feeling the need of a journal which should represent the special branches of ophthalmology and otology, founded the *Annals of Ophthalmology and Otology*. The purposes of the new journal as set forth in its Prospectus were as follows:

### PROSPECTUS OF THE ANNALS OF OPHTHALMOLOGY AND OTOTOLOGY—1892.

It is believed by the Incorporators of the Association under the authority of which the *Annals of Ophthalmology and Otology* is published, that with the recent great advances made in medical science and art, the time has come when the busy progressive practitioners of medicine in the Western and Southern States will give substantial support to a Periodical devoted to Practical Ophthalmology and Otology, including their allies, Rhinology and Laryngology.

The *Annals* is published with the following aims:

1. To afford Specialists, with well-earned reputations, a medium for communicating the results of their observation and research, and to disseminate meritorious contributions to the literature of Ophthalmology, Otology, Rhinology, and Laryngology, giving especial attention to Practical Articles devoted to Medical Ophthalmology, Ophthalmoscopy, and the Pathological relations between the Eye, Ear, Nose, or Throat, and the general system. It is hoped that the interests of the General Surgeon and Physician, as well as of the Specialist, will be subserved by such a Journal.

2. To furnish a brief condensed Report of Progress in the four important departments of Medical Science mentioned, in which shall be recorded the most recent advances of real and permanent value and practical interest, from the current medical literature of the World. These reports will be written by specialists well qualified for the work.

Each number of the *Annals* will contain about eighty pages, and will be issued quarterly. The yearly volume will thus contain about three hundred and twenty pages, fully indexed.

The subscription price will be Two Dollars per annum, in advance.

Address all communications to the editor,

JAMES P. PARKER, M. D.

S. E. Cor. 12th St. & Grand Ave.,  
Kansas City, Mo.

The idea of starting a special journal west of the Mississippi was a very ambitious one, although ground had been broken by the American Journal of Ophthalmology. However, the new journal was to be a quarterly, was to contain articles on oto-laryngology as well as ophthalmology, and in addition was to contain a review of the best literature on these subjects, published in other magazines. Dr. Parker, from the very beginning surrounded himself with a strong staff, consisting of Drs. Casey A. Wood, B. E. Freyer, T. Melville Hardie and M. D. Lederman, in which additions and changes were made from time to time as occasions arose. The contributors to the first number were Drs. D. B. St. John Roosa, M. Michel, Edward Jackson, Geo. M. Gould, Peter D. Keyser, Casey A. Wood, Julian J. Chisholm, S. D. Risley, J. Herbert Claiborne, Henry L. Wolfner, George T. Stevens, Charles H. Burnett, Lawrence Turnbull, J. A. Maloney, S. MacCuen Smith and J. W. Gleitsman, all men of high standing in their respective specialties. In 1893 Dr. Parker moved to St. Louis, from which city the *Annals* was published continuously up to and including 1917. The high class of the contributions of the first number has been consistently maintained, and the progress of ophthalmology and oto-laryngology in the United States is in a large measure due to the papers that have appeared in the *Annals*. Moreover, from its editorial staff have graduated the editors of two other prominent ophthalmic journals.

In 1896, Dr. Parker died, but this sad event was not permitted to cause the death of the journals. Mr. Jones H. Parker continued it is a memorial to his brother, and placed the active conduction in the hands of Dr. Casey A. Wood, of Chicago. Dr. Wood remained editor until 1900, when he left to become the editor of the *Ophthalmic Record*. He was succeeded by Dr. H. V. Wurdeman, of Milwaukee, who remained the editor until 1904. At that time, he in turn left to become editor of *Ophthalmology*. He was succeeded by Dr. James Moores Ball of St. Louis,

who held the position until 1906, when Dr. W. A. Shoemaker of Philadelphia became editor and held the position until 1911, when he was succeeded by the last editors, Drs. Meyer Wiener and Clarence Loeb. In the meantime, the number of papers had become so great, and the divergence between the specialties of Ophthalmology and Oto-laryngology had proceeded so far, that in 1897 the *Annals* was issued in two separate publications, known thenceforth as the *Annals of Ophthalmology* and the *Annals of Otology, Rhinology and Laryngology*, the latter with Dr. H. W. Loeb of St. Louis as editor. In 1917 Mr. Parker, believing it for the best interest of the profession, gave his consent to the merger of the *Annals of Ophthalmology* with the other journals which now constitute the AMERICAN JOURNAL OF OPHTHALMOLOGY, May the hopes which prompted the founder and animated the various editors and staffs of the *Annals* be brought to an even more fruitful realization.

C. L.

### THE OPHTHALMIC RECORD.

In the first issue of the *Ophthalmic Record*, I wrote, as founder and editor: "No chorus of voices, imaginary or real, has called him to the editorial chair"; and in the same editorial I wrote: "The editor and publisher of the *Ophthalmic Record* has contemplated, for a long while, entering the field of journalism." The two statements quoted above expressed the truth, but not the whole truth, concerning the inception of the *Record*. Its publication certainly would not have been started in 1891, and possibly never, if an event had not occurred which, in itself, might have deterred, rather than have encouraged, such a venture. No record of this event has been made up to the hour of writing this "bit" of history; and it is given now only because it cannot harm the one who is living, and cannot reflect on the noble character of the one who is dead—there were only two parties concerned.

I had discovered the secret of oblique astigmatism in the fact that retinal images were distorted and displaced by



it; and that, to harmonize such images—as the two images of a horizontal arrow—the oblique muscles had to perform an abnormal function, that of either converging or diverging the vertical axes of the eyes, their normal function being to keep these axes parallel. In the latter part of 1890, I prepared a paper on the subject, wording the title as follows: “The Harmonious Symmetrical Action of the Oblique Muscles in All Cases of Oblique Astigmatism.” I went to some cost, and exercised severely my power of designing, to procure suitable illustrations, and early in 1891 offered it for publication in the leading eye journal of America, if not of the world. I read the paper before the Nashville Academy of Medicine on the 15th day of January, of that year, having forwarded, only recently, a copy of the paper for publication. I was so sure that it would be published I ventured to state that it would appear in an early issue of the *Archives of Ophthalmology*. I had made it a point to celebrate my thirty-seventh birthday anniversary by the presentation of the paper to the Academy of Medicine.

In forwarding the paper to Dr. Herman Knapp, I requested that it be given as early publication as possible, for the reason that some other man, who might be working on the same line, might antedate me in publication. I was only a few days older when I found, in my morning mail, a letter from Dr. Knapp in which he stated that, since he could not give my paper an early publication, he was returning the copy to me. I wondered then, and I wonder now, if the explanation he gave for returning the copy was his only reason. I thought then and I think now that he judged the paper unsound in teaching and did not wish the *Archives* to give publicity to the supposed errors contained in it. My judgment in this matter may have been wrong.

The hour had struck for the birth of a new special journal, and I at once arranged for its publication. The first type assembled spelt the title of the paper that had been returned. In the first number of the *Record* it went forth to meet its critics in mortal combat, and it survived, for the truth of its teaching was both its helmet and shield.

There are three things of which I am glad:

(1) The return of my paper never made the slightest difference in the personal relationship between Dr. Knapp and myself. We remained the best of friends to the end of his long and useful career. No one had greater admiration for him than I, from my first acquaintance with him to the day of his death, and I revere his memory.

(2) I am glad that the *Record* was started at the time it was, for a few months later, I would not have undertaken the labor and expense of the publication, because of an attack of the bronchial form of grippe from which I did not entirely recover during the five years of my ownership and control of the journal. Having launched the ship it must sail on, and it must bear to my confreres freight that would be of value to them.

(3) I am glad that, at the end of the fifth volume, I found Dr. Casey A. Wood both willing and able to assume ownership and control of the publication, which had grown to be a burden too heavy for me to carry; for all of my time was needed for my teaching in the medical department of Vanderbilt University, and for the practical work of my office and infirmary. At that time my health had not been fully restored.

I mailed No. 12 of volume 5, with the determination to continue the publication of the *Record*, unless I could place it in the hands of some one who could carry it on successfully. Dr. Wood came first into my thinking, and to him only was the *Record* tendered. I rejoiced at the transfer made to one so well known and so capable; and the intervening years, marked by the increased usefulness of the *Record*, have added to my joy.

A short lapse was necessary between the close of volume 5 and the beginning of volume 6. In the first number of the new volume I find another one of my papers, the title being “Image Changes Caused by Astigmatism and by Correcting Cylinders.”

In closing this contributed “bit” I must give vent to two expressions, one of congratulation and one of regret:



(1) I most heartily congratulate Dr. Wood on his successful editorial conduct of the *Record*. The twenty-one volumes he has issued have been brimfull of good things for ophthalmologists, everywhere, to think about and to put into practice. (2) I regret that the *Ophthalmic Record*, as an individual entity, is to appear no more; I also regret that the new "merger" is not to be called *The American Ophthalmic Record*. But under any other name a rose would smell as sweet. Great success to the new

AMERICAN JOURNAL OF OPHTHALMOLOGY.

When I transferred the *Record* to Dr. Wood, I acted more wisely than I had dreamed, for in doing this I made the *American Encyclopedia of Ophthalmology* a possibility, for I believe that Wood's work on the *Record* incited him to the greater task. If this surmise is correct, the *Record* did not live a life of twenty-six years in vain. Great has been the *Record*! Monumental and colossal is the *Encyclopedia*! G. C. SAVAGE.

## BOOK NOTICES.

**Greenwood, Allen; de Schweinitz, George E.; and Parker, Walter R. MILITARY OPHTHALMIC SURGERY**, Medical War Manual, No. 3. Authorized by the Secretary of War, under the supervision of the Surgeon General and the Council of National Defense. Philadelphia and New York: Lea and Febiger. 1917. Price, \$1.50.

This little hand-book of 115 pages contains suggestions helpful to Medical Officers who have to deal with the special ophthalmic problems in daily routine of active Army Medical work, especially in the dressing stations and hospitals throughout the War Zone.

Is it in no sense a complete treatise. The conditions dealt with in Major Greenwood's essay are those of wounds of the eyeball, perforating and penetrating wounds of the eye, traumatic cataract, penetrating wounds of the orbit, wounds of the eyelids, prophylaxis of the eye, conditions that are an express or diagnostic symptom of disease or injuries elsewhere. Notes on psychoneurosis and refraction are given. The implantation of glass globes in enucleation is advised, and stress is laid upon the Kuhnt keratoconjunctival plastics for ulceration and perforating wounds of the cornea.

The principal duty of the Field and War Zone Surgeon is to repair and clean the wound with removal of for-

eign bodies. The first reparation of the tissue is the most essential for the cosmetic and ultimate economic results. Plastics may be well left for the Base Hospital, far removed from the firing zone. An interesting and valuable contribution is that of the arm magnet, which is slung over the operator's shoulder and may be used for most purposes of removal of magnetic foreign bodies.

The article by Major de Schweinitz on Trachoma and Common Forms of Conjunctivitis is quite complete, and is written in his inimitable style. It is really a practical treatise on the subject.

The article on Examination of Malignancies, by Major Parker, contains all the well known tests, is well and succinctly written; and is a reliable guide for such examination. These chapters are of special value to the officers conducting cantonment examinations.

A short syllabus of terms of diseases, injuries and eye operations, with an index, is appended. H. V. W.

**TRANSACTIONS OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY, Volume 15.** Fifty-third Annual Meeting, 1917. 8vo. 332 pages, 16 plates, 14 ill. Published by the Society. William M. Sweet, Secretary, Philadelphia.

These transactions are not so well known to the ophthalmologists of

America as they should be. Heretofore they have been published in annual parts unbound, three or more of these parts making one volume. Hence it is that the proceedings of the fifty-third meeting are numbered only volume fifteen. This year they appear in a substantial, neatly bound volume; and hereafter each year, such a volume is to be issued.

Although each part has cost each member of the Society five dollars or more of his annual dues, they have been sold at a much lower price, and they ought to appear in the working library of every American ophthalmologist who accumulates a library. They contain a large part of the best contributions to ophthalmic literature that have emanated from American authors.

With perhaps one exception, the American Ophthalmological Society is

the oldest special medical society in the world. It is certainly the oldest ophthalmologic society among English speaking peoples. And while it has failed to develop into a truly national organization, the scientific and literary excellence of its transactions have maintained a very high standard.

For the last years, there have been included with the papers and discussions that have constituted the scientific proceedings of the annual meeting, the theses of candidates accepted into membership in the Society. Those of Dr. Harvey Howard and Dr. William Tarun, published in the present volume, give promise that the young men now gaining entrance to the Society are capable of maintaining the high standard of these transactions in the future.

E. J.

## CORRESPONDENCE.

### STAINING CORNEAL ULCERS.

AMERICAN JOURNAL OF OPHTHALMOLOGY:

They say that "Necessity is the mother of invention," and I have been wondering if the failure of the dispensary of the Base Hospital here to fill a prescription for fluorescein to stain a corneal ulcer has led me into something new and good, or whether my new corneal ulcer stain is old and has been tried and discarded for some valid reason.

In casting about for a stain, I hit on a two per cent aqueous solution of methylene blue. The results were startlingly beautiful. To the very edge of the most minute abraded area, the stain was intense and distinct. Not knowing if the blue would smart, I preceded it with one drop of a two per cent solution of cocain. There was no pain. In an hour, the stain was about half washed away, and in two hours it was all gone.

The next day, I used it without cocain and there was no pain, and again

the stain was perfect. Neither the healthy cornea nor the conjunctiva take the stain at all.

There was some conjunctival inflammation; but I could not say that it was due to the stain or increased by it. The stain was immediately washed out with boracic acid (two per cent) solution. If it gets on the skin, it stains it; but that easily washes off; or if vaseline is used on the skin of the lower lid and side of nose, no stain results. I am not treating the ulcer, serpiginous in character, with any other medication, as I want to see if the stain has any curative value.

This is certainly a busy place. We see from forty to one hundred and seventy-five patients in my section every day, and some days the clinics remind me of Vienna, New York, or Chicago. The only eye operations so far are for pterygia; but tonsil and septal work is without end.

Sincerely,

A. C. MAGRUDER,  
Captain, M. R. C.

Camp Doniphan, Oklahoma.

# NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colo. As these columns go to press on the 30th of the month contributors should send in their items before that date. The following gentlemen have consented to supply the News Item Editor with the news from their respective sections: Dr. James A. Black, San Francisco; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. H. Kress, Los Angeles; Dr. W. Holbrook Lowell, Boston; Dr. Henry R. Skeel, New York City; Dr. Chas. P. Small, Chicago; Dr. Geo. M. Waldeck, Detroit; Dr. Oscar Wilkinson, Washington. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered, as well as all foreign countries. Volunteers are therefore needed, and it is hoped that they will respond promptly to this call.

Dr. J. W. Kimberlin, of Kansas City, Missouri, will go abroad as ophthalmologist, with Base Hospital, No. 28.

Dr. W. W. Blair of Pittsburgh, who heads the Committee on Conservation of Vision of the Pennsylvania Medical Association, has worked out some plans whereby the work may be increased in efficiency.

Dr. Robert Scott Lamb, of Washington, D. C., read a paper before the Shenandoah Valley Medical Society at Winchester, Va., December 18th, 1917, upon "Some Things a General Practitioner Would Do Well to Know About Eyes."

Dr. Burton Chance has been assigned to the Aviation Examining Board at the University of Pennsylvania.

Dr. R. Evatt Mathers, of Halifax, Nova Scotia, writes that, during the recent disaster, in one day he did forty enucleations at the Victoria General Hospital, with three other oculists working just as hard in other hospitals.

The Ophthalmological Society of the United Kingdom will hold its next meeting in London, May 2nd, 3rd, and 4th, 1918. E. Treacher Collins, President, and M. S. Mayou, 30 Cavendish Square, W., Secretary.

The first annual meeting of the shareholders of the British Journal of Ophthalmology, Ltd., was held Dec. 12, 1917. In addressing the meeting the chairman, Mr. J. B. Lawford, said that the directors felt well pleased with the progress of the company to date. The financial position was sound and the outlook encouraging. The list of subscribers exceeded their expectation, and he thought they were justified in stating that the journal had been an undoubted success. Messrs. J. Herbert Parsons and W. G. Laws were elected to the vacancies created by the retirement of Sir Anderson Critchett and Mr. J. Gray Clegg.

A campaign to raise \$100,000 for the Maryland workshop for the blind was started January 14, in Baltimore, to take care of the increased number of blind, and blind soldiers returned from the front. It is to be equipped with new machinery and other facilities for a workshop for the blind.

Dr. George L. Strader of Cheyenne, Wyoming, is spending the winter at Hollywood, California, and is reported to be much improved in health.

Denver has been selected as the next meeting place of the American Academy of Ophthalmology. The date of meeting will be some time in August.

We learn with regret of the death of Mrs. Finnoff, wife of Captain William C. Finnoff, formerly of Denver, now stationed at Camp Funston.

More than 210 persons were blinded through the terrible explosion which occurred in Halifax. A committee for relief work among such sufferers was instituted through the efforts of Sir Frederick Fraser, Superintendent for the School for the Blind at Halifax.

Dr. D. S. Hager has completed the annual re-examination for sight, color-sense and heart of the trainmen of the Santa Fe System, on the eastern and western lines.

The indictment against Dr. George B. Schwachtgen, Aurora, for failure to report a case of ophthalmia in an infant, was nolle prossed at the request of State's Attorney Philips of Elgin.

Dr. V. A. Chapman of Muskegon, Mich., announces that he has taken charge of Dr. Nelson M. Black's practice. The latter has been called to Washington for service on the Council of National Defense.

Stähli of Zurich, who has been especially interested in the field of "labyrinthine ophthalmostatics," calls attention to the fact



that in a few years the centennial of the discoveries by Flourens in this line can be celebrated.

The Council of the British Medical Association has awarded the Middlemore Prize for 1917 to William Clark Souter for his essay on "Disorders of the Eye and of Its Functions Induced by War Injuries Not Directly Affecting the Eye."

#### CHICAGO NOTES.

Capt. Chas. M. Robertson is detailed in Chicago for the special research work in the aviation department.

Dr. Sydney Walker, Jr., P. A. Surgeon in the 6th Regiment, Marine Corps, is at present on duty in France.

Dr. Herbert Walker has been given a captain's commission, M. R. C., and is to be assigned to the ophthalmologic department, Base Hospital 22, in Milwaukee.

Major William H. Wilder has been ordered home from Camp Taylor to the inactive list. Dr. T. D. Allen, who has been Dr. Wilder's office assistant for the past six months, is a first lieutenant, M. R. C., and has left with Hospital Unit No. 13, for Camp McPherson, Atlanta, Ga.

Major Casey Wood has been transferred from Chief of the Ophthalmic Service, and Head of the Section of Head Surgery, Camp Sherman, Ohio, to have charge of the Literary Department, Special Hospitals, and Reeducation of the Returned Disabled Soldier, on the staff of the Surgeon-General in Washington.

Major C. A. Leenheer is on active duty at Camp Houston, Texas.

Dr. Alexander S. Rochester is on active duty somewhere in France.

Dr. Elzear LaMothe has just received a First Lieutenant's commission, M. R. C.

Capt. Charles J. Swan has been sent to Philadelphia for special study in the department of brain surgery.

At the annual meeting of the Chicago Ophthalmological Society held on January 21st, the following officers were elected for the ensuing year: President, Heman H. Brown; vice-president, Thomas O. Edgar of Dixon, Illinois; secretary-treasurer, Alfred Murray; counselor, J. F. Burkholder. Major Frank Billings was the guest of the evening and gave to the members of the society a most illuminating talk on the present situation in Russia. While in that country recently as head of the American Red Cross Mission, Dr. Billings came in close touch with some of the most representative leaders in the various governmental and army departments, such as Kersensky, Korniloff, Miliukoff and others, and through this personal knowledge thus

gained, to interpret very vividly the actual conditions there, which are so difficult for the uninstructed to grasp.

Captain R. R. Cruise has devised a visor made of a mesh of steel rings closely linked together, and fastened to the helmet. The Ophthalmological Society of the United Kingdom in endorsing its use, states that it believes it would prevent at least 50 percent of the eye injuries received in warfare. The visor has received the strong approval of ophthalmic surgeons in the field and at home.

Attention has been called to a nostrum put on the market by the Valmas Drug Company, Detroit, under the name of Bon-Opto. This "eye medicine" is sold under the claim that it will "Make Weak Eyes Strong," that it "Strengthens Eyesight 50 Per Cent in One Week's Time in Many Instances," etc. The state chemists of New Hampshire state that Bon-Opto contains:

Sodium Chloride .....	39.2
Zinc Sulphate .....	6.83
Boric Acid .....	39.69
Menthol .....	a small amount

The retiring President read the following Roll of Honor of members of the Chicago Ophthalmological Society now in active service and those who have received commissions but have not been called to duty:

#### Majors.

Maj. Casey A. Wood, Surgeon General's Office, Washington, D. C.

Maj. William H. Wilder, Camp Taylor, Louisville, Ky., Base Hospital.

Maj. Thomas A. Woodruff, Fort Gredel, Rhode Island.

Maj. Cornelius A. Leenheer, 108 Engineer Corps, Camp Logan, Houston, Tex.

Maj. George F. Suker, Camp Custer, Battle Creek, Mich., Base Hospital.

Maj. Nelson M. Black, Surgeon General's Office, Washington, D. C.

Maj. Frank C. Todd, Camp Dodge, Iowa, Base Hospital.

#### Captains.

Capt. Francis Lane, In Charge of Medical Examining Unit, Aviation Corps, Chicago.

Capt. Ephraim K. Findlay, Post Hospital, Fort Snelling, Minn.

Capt. Harry S. Gradle, Base Hospital, Camp Grant, Rockford, Ill.

Capt. Sydney Walker, Jr., Marine Corps, now in France.

Capt. Herbert Walker, Base Hospital, Unit No. 22, Milwaukee, Wis.

Capt. Charles M. Robertson, detailed for special research work in aviation, Chicago.

Capt. Charles J. Swan, detailed to the University of Pennsylvania, Philadelphia, for special work in brain surgery.

First Lieutenant Charles P. Small, Medical Examining Unit, Aviation Section, Signal Corps, Chicago.

First Lieutenant Alexander S. Rochester, now in France.

**Commissioned But Not As Yet Assigned to Active Service.**

Capt. Charles F. Burkhardt, Effingham, Ill.

Capt. George A. Darner, Aurora, Ill.

First Lieut. E. LaMothe, Chicago, Ill.

#### LOS ANGELES NOTES.

Los Angeles is one of the cities which Major Isaac Jones decided upon as a place where an examining board for aviation candidates might be well established.

The Los Angeles Medical Department of the University of California was able to offer facilities which were very well adapted for this work, and at a conference of the initial group which had been gotten together, Major Jones stated that he would

strive to have Captain William H. Roberts of Pasadena, who was on detail in the East, assigned to Los Angeles to be at the head of this examining unit.

It was hoped to establish a complete medical board, the candidates at the present time still being obliged to go to San Diego for general, physical, mental and moral examinations, and then receiving papers to present themselves at Los Angeles. The number of applicants who have been examined have on some days been extremely large, but the work has gone steadily forward, Captain Roberts being assisted by a group of a dozen or more colleagues.

The Eye, Ear, Nose and Throat section of the Los Angeles County Medical Association has been having a series of very interesting meetings recently. The officers of this section are Dr. George W. McCoy, president; Dr. C. G. Stivers, secretary, and Dr. C. H. Montgomery, councilor. In future issues note will be made of the proceedings of the Section.

# OPHTHALMIC LITERATURE.

Under this head continuing the "Index of Ophthalmology" heretofore published in **Ophthalmic Literature** will be found the subjects of all published papers received during the last month, that bear to an important extent upon ophthalmology. The subject is indicated rather than the exact title given by the author. Where the original title has been in a foreign language it is translated into English. The journal in which the paper is published will indicate the language of the original.

The names of the different journals are indicated by abbreviations which generally correspond to those used by the **Index Medicus**, the **Journal of the American Medical Association**, and the **British Journal of Ophthalmology**. We will from time to time publish the list of ophthalmic journals, with the abbreviations used for each. Often a single letter discriminates between journals published in different languages. Thus "Arch. of Ophth." refers to the Archives of Ophthalmology, published in English; "Arch. d'Opht.," indicates the French Archives d'Ophtalmologie; "Arch. de Oftal." refers to the Archivos de Oftalmologia Hispano-Americanos, while "Arch. di Ottal." indicates the Italian Archivio di Ottalmologia.

In this index of the literature the different subjects are grouped under appropriate heads; so that all papers bearing on the same, or closely related subjects, will be found in one group. The succession of the groups is the same from month to month, and identical with that of the Digest of the Literature. Where a paper clearly refers to two subjects that belong in different groups, it will be noticed in both groups.

Each reference begins with the name of the author in heavyface type. This is followed by the subject of his paper. Then in brackets a number with (ill.) indicates the number of illustrations, or a number with (pl.) the number of plates illustrating the article, (col. pl.) indicates colored plates. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that the paper was read before some society and gave rise to a discussion which is published with it.

It is desired to notice every paper as soon as possible after it is published. Readers will confer a favor by sending titles they notice have been omitted, with journal and page of publication; and of their own papers, sending either a copy of the journal in which each appeared, or a reprint. These should be sent as soon as possible to 318 Majestic Building, Denver, Colorado.

## METHODS OF DIAGNOSIS.

- Bernstein, E. J.** Diagnosis of Cerebellar Abscess. *Ann. Otol. Rhin. and Laryngol.*, v. 26, p. 804.
- Records of Visual Acuity.** *Amer. Jour. Ophth.*, v. 1, p. 71.
- Report of Committee on Standardization of Illumination of Test-Cards and Perimeters.** *Amer. Ophth. Soc.*, v. 15, p. 324.
- Tests of Visual Acuteness.** *Jour. Amer. Med. Assn.*, v. 70, p. 259.
- Walker, C. B.** Quantitative Perimetry. (9 Fig., 3 pl.) *Trans. Amer. Ophth. Soc.*, v. 15, p. 166. *Arch. of Ophth.*, v. 46, p. 537.
- Wells, D. W.** Adaptability of Phoro-optometer Stereoscope for Haitz and Bissell Charis. *Amer. Jour. Ophth.*, v. 1, p. 20.
- Wescott, C. D.** Visual Examinations. *Railway Surg. Jour.*, v. 24, p. 1.

## THERAPEUTICS.

- Fergus, F.** Salvarsan and Other Remedies in Ophthalmic Practice. *Arch. of Ophth.*, v. 47, p. 29.
- Santos Fernandez, J.** Cure of Nonsyphilitic Affections of Eye by Mercurials. *Arch. de Oft.*, v. 17, p. 113. *Amer. Jour. Ophth.*, v. 34, p. 374.

- Smith, C. L.** Eserin in Ophthalmic Practice. *Jour. Kansas Med. Soc.*, v. 18, p. 11.

## OPERATIONS.

- Crossley, E. R.** Device to Immobilize Head and Lids. *Chicago Ophth. Soc.*, Oct. 15, 1917. *Amer. Jour. Ophth.*, v. 1, p. 66.
- Wood, H.** Technic in Surgery of Eye, Ear, Nose and Throat. *South. Pract.*, v. 39, p. 295.

## REFRACTION.

- Howe, L.** Ergograph Registration of Fatigue in Accommodation. (Dis.) *Amer. Ophth. Soc.*, v. 15, p. 145.
- Schranz, J. H.** Seat of Astigmatism. *South-west Jour. Med. and Surg.*, v. 25, p. 283.

## OCULAR MOVEMENTS.

- Briggs, H. H.** Tendon Shortening. *Internat. Jour. Surg.*, v. 30, p. 394.
- Bonner, H. M.** Hyperopia, One Cause of Crossed Eyes. *Charlotte Med. Jour.*, v. 22, p. 13.
- Hassin, G. B.** Hemiplegia with Weber's Syndrome. *Jour. Amer. Med. Assn.*, v. 69, p. 2169.



- Heydt, R. von der.** Management of Squint. Chicago Ophth. Soc., Oct. 15, 1917. Amer. Jour. Ophth., v. 1, p. 63.
- Jones, I., and Langdon, H. M.** Relation Between Eye and Ear Shown by Bárány Tests. Sec. on Ophth., Coll. Phys., Phila., Oct. 18, 1917. Amer. Jour. Ophth., v. 1, p. 55.
- Simpson, J. H.** Etiology of Squint. Internat. Jour. Surg., v. 30, p. 383.
- Theobald, S.** Chief Function of Oblique Muscles of Eye (1 ill.). Bull. Johns Hopkins Hosp., v. 29, p. 15.
- Wells, D. W.** Exophoria and Convergence Treated by Fusion Training (236 cases). Jour. Ophth., Otol. and Laryngol., v. 23, p. 806.
- Williams, C. E.** Harman's Reefing Advancement and Jig-saw Operation. Jour. Ophth., Otol. and Laryngol., v. 23, p. 298.

## CONJUNCTIVA.

- Jefferson, F., and Armstrong, W. E. M.** Treatment for Conjunctivitis. Jour. Roy. Army Med. Corps, v. 29, p. 112.
- Maxey, E. E.** Primary Syphilis of Palpebral Conjunctiva. (Bibl.) Amer. Jour. Ophth., v. 1, p. 13.
- Mohr, M.** Conjunctivitis from Typhoid Bacilli. Klin. M. f. Augenh., 1916, p. 523. Arch. of Ophth., v. 47, p. 92.
- Pascheff.** Infectious Necrotic Conjunctivitis. Heidelberg Ophth. Cong., 1916. Arch. of Ophth., v. 47, p. 93.
- Pollnow.** Rare Proliferations of Vernal Catarrh. Deutsch. med. Woch., 1916, p. 557. Arch. of Ophth., v. 47, p. 93.
- Pratt, J. A.** Total Symblepharon. Jour. Lancet, v. 38, p. 40.
- Roenne, H.** Optochin in Treatment of Chronic Conjunctivitis. Klin. M. f. Augenh., 1916, p. 301. Arch. of Ophth., v. 47, p. 93.
- Roth, A. W.** Total Symblepharon Resulting from Trachoma. Jour. Okla. Med. Assn., v. 10, p. 230.
- Salzmann, M.** Arch. f. Dermatol. u. Syphilis., v. 120, p. 1. Arch. of Ophth., v. 47, p. 97.
- Shastid, T. H.** Composite Ophthalmia Neonatorum Law. Amer. Jour. Ophth., v. 1, p. 43.
- Spitze, E. C.** Parinaud's Conjunctivitis. Amer. Jour. Ophth., v. 34, p. 364.
- Stargardt, K.** Etiology of Phlyctenular Ophthalmia. Heidelberg Ophth. Cong., 1916. Arch. of Ophth., v. 47, p. 93.
- Tuchler, A. S.** Treatment of Inflammation of Eyes. Calif. Eccl. Med. Jour., v. 39, p. 4.

## CORNEA AND SCLERA.

- Fox, L. W.** Note on Application of Heat in Corneal Ulcer. (Priority.) Jour. Amer. Med. Assn., v. 69, p. 1193.
- Jackson, E.** Extreme Conical Cornea. Colo. Ophth. Soc., Nov. 17, 1917. Amer. Jour. Ophth., v. 1, p. 60.
- Patterson, J. A.** Interstitial Keratitis. Colo. Ophth. Soc., Nov. 17, 1917. Amer. Jour. Ophth., v. 1, p. 61.

- Schewinitz, G. E. de, and Woods, A. C.** Trypanosome Keratitis. (1 pl. Bibl.) Trans. Amer. Ophth. Soc., v. 15, p. 107.
- Shahan, W. E.** Corneal Thermotherapy. Amer. Jour. Ophth., v. 34, p. 321. Amer. Jour. Ophth., v. 1, p. 54.
- Uribe Troncoso, M.** Ocular Changes in Acne Rosacea Complicated with Fasicular Keratitis. (3 ill. Bibl.) Arch. of Ophth., v. 47, p. 1.
- v. Wehde.** Optochin Treatment of Corneal Serpentine Ulcer. Rostock Diss., 1916. Arch. of Ophth., v. 47, p. 100.

## ANTERIOR CHAMBER AND PUPIL.

- Löwenstein, A., and Kubik, J.** Refractometric Investigations of Aqueous Humor. Graefe's Arch. of Ophth., v. 89, pt. 2. Brit. Jour. Ophth., v. 2, p. 57.
- Magitot, A.** Origin of Aqueous Humor. Ann. d'Ocul., v. 154, Feb., March, April, 1917. Brit. Jour. Ophth., v. 2, p. 53.
- Speciale Cirincione.** Development of Anterior Chamber. Ann. di Ottal. e Clin. Ocul., 1917, pp. 161, 249. Amer. Jour. Ophth., v. 1, p. 46.
- Tarun, W.** Pupillary Studies with Reference to Anisocoria. (Bibl.) Trans. Amer. Ophth. Soc., v. 15, p. 301.

## UVEAL TRACT.

- Ellett, E. C.** Heterochromia Iridis; Heterochromic Cyclitis and Allied Conditions. (Dis.) Trans. Amer. Ophth. Soc., v. 15, p. 31. Arch. of Ophth., v. 46, p. 562.
- Feingold, M.** Essential Atrophy of Iris. (1 col. pl., 6 ill. Bibl.) Amer. Jour. Ophth., v. 1, p. 1.
- Fuchs, E.** Shrinking of Iris. Klin. M. f. Augenh., v. 56, p. 145. Arch. of Ophth., v. 47, p. 102.
- Howard, H.** Anomalous Development of Uveal Tract. Trans. Amer. Ophth. Soc., v. 15, p. 277.
- Jackson, E.** Chronic Uveitis with Opaque Nerve Fibres. Colo. Ophth. Soc., Nov. 17, 1917. Amer. Jour. Ophth., v. 1, p. 60.
- Jakob.** Temporary and Permanent Iris Pigment on Anterior Surface of Lens. Tijdschr. v. Geneesk., 1917, p. 540.
- Krebs, A.** Diseases of Eye from Focal Infection. Penn. Med. Jour., v. 21, p. 251.
- Lang, W.** Etiology and Treatment of Iritis. Lancet, June 23, 1917, p. 956. Amer. Jour. Ophth., v. 1, p. 53.
- Loeb, C.** Hereditary Upward Coloboma of Iris. Other Hereditary Conditions. Chicago Ophth. Soc., Oct. 15, 1917. Amer. Jour. Ophth., v. 1, p. 62.
- Masuda.** Disseminated Choroiditis with Scrofuloderma. Nippon Gank. Zasshi, Jan., 1917. Amer. Jour. Ophth., v. 1, p. 55.
- Shannon, C. E.** Congenital Coloboma of Iris and Choroid. (2 pl.) Amer. Ophth. Soc., v. 15, p. 43.

## SYMPATHETIC DISEASE.

- Brown, E. V. L.** Sympathetic Ophthalmia and Other Forms of Uveitis. Chicago Ophth. Soc., Oct. 15, 1917. Amer. Jour. Ophth., v. 1, p. 66.

**Wood, C. G. R.** Etiology of Sympathetic Ophthalmitis. *Brit. Jour. Ophth.*, v. 2, p. 27.

### GLAUCOMA.

**Ewing, A. E.** Postteiliary Scleral Trephining for Glaucoma; Conjunctival Flap; Improvised Trephine. *Amer. Jour. Ophth.*, v. 34, p. 362.

**Gertz.** Detachment of Retina after Elliot's Trephining. *Ophth. Gesell., Copenhagen*, March, 1916. *Arch. of Ophth.*, v. 47, p. 105.

**Gunnufsen.** Tonometry of Buphthalmos in Sleeping Patient. *Klin. M. f. Augenh.*, v. 46, p. 428. *Arch. of Ophth.*, v. 47, p. 106.

**Harrower, D.** Iridotaxis in Glaucoma. *Trans. Amer. Ophth. Soc.*, v. 15, pp. 122, 130. *Arch. of Ophth.*, v. 47, p. 37.

**Koeppel.** Iris Pigment in Glaucoma. *Heidelberg Ophth. Cong.*, 1916. *Arch. of Ophth.*, v. 47, p. 106.

**Libby, G. F.** Glaucoma Secondary to Perforating Corneal Ulcer. *Colo. Ophth. Soc.*, Nov. 17, 1917. *Amer. Jour. Ophth.*, v. 1, p. 58.

**Magitot, A.** Variations in Ocular Tension and Injuries. *Ann. d'Ocul.*, v. 154, p. 667.

**Maynard, F. P.** Intraocular Hemorrhage after Operation for Glaucomatous Cataract. *Brit. Jour. Ophth.*, v. 2, p. 26.

**Moulton, H.** Miotics in Treatment of Simple Chronic Glaucoma. *Southwest Jour. Med. and Surg.*, v. 25, p. 115.

**Norton, A. B.** Glaucoma; Elliot Corneoscleral Trephining. *Jour. Amer. Inst. Homeop.*, v. 10, p. 917.

**Roy, D.** Infection after Operation of Iridotaxis for Glaucoma. (1 pl.) *Trans. Amer. Ophth. Soc.*, v. 15, p. 126. *Arch. of Ophth.*, v. 47, p. 42.

**Weeks, J. E.** Glaucoma Resulting from Herpes Zoster. *Trans. Amer. Ophth. Soc.*, v. 15, p. 134. *Arch. of Ophth.*, v. 46, p. 460.

### CRYSTALLIN LENS.

**Burge, W. E.** Production of Cataract. (7 ill. Bibl.) *Arch. of Ophth.*, v. 47, p. 12.

**Jackson, E.** Vision after Congenital Cataract. *Colo. Ophth. Soc.*, Nov. 17, 1917. *Amer. Jour. Ophth.*, v. 1, p. 59.

**Marbourg, E. M.** Dislocation of Lens. *Colo. Ophth. Soc.*, Nov. 17, 1917. *Amer. Jour. Ophth.*, v. 1, p. 61.

**Meyer-Steinieg, T.** Nonoperative Treatment of Cataract. *Amer. Jour. Ophth.*, v. 34, p. 378.

**Newman, E. A. R.** Irrigation after Extracapsular Extraction of Cataract. *Indian Med. Gaz.*, v. 52, p. 280.

**Scheube.** Nonoperative Treatment of Senile Cataract. *Inaug. Diss. Jena. Arch. of Ophth.*, v. 47, p. 105.

**Shanker, H.** Suppuration after Cataract Operation. *Indian Med. Gaz.*, v. 52, p. 281.

**Tooker, C. M.** Double Congenital Cataract and Total Aniridia. *Amer. Jour. Ophth.*, v. 34, p. 370.

### VITREOUS.

**Appleman, L. F.** Massive Spontaneous Hemorrhage into Vitreous. (Bibl.) *Amer. Jour. Ophth.*, v. 1, pp. 24, 70.

**Holloway, T. B.** Asteroid Hyalitis. (Bibl.) *Amer. Ophth. Soc.*, v. 15, p. 153. *Arch. of Ophth.*, v. 47, p. 50.

**Howard, H.** Multiple Congenital Abnormalities of Eye: One Indicating Origin of Vitreous. (3 pl. Bibl. Dis.) *Trans. Amer. Ophth. Soc.*, v. 15, p. 244.

### RETINA.

**Bailliant, P.** Arterial Pressure and Branches of Central Retinal Artery; New Technic for Determination. (5 ill.) *Ann. d'Ocul.*, v. 154, p. 648.

**Brandeis, J. W.** Amaurotic Family Idiocy. (1 ill.) *New York Med. Jour.*, v. 107, p. 121.

**Hirschberg, J.** Central Recurrent Retinitis in Syphilitics. *Cent. f. p. Augenh.*, March-April, 1916. *Arch. of Ophth.*, v. 47, p. 109.

**Jennings, J. E.** Aneurisms of Retinal Arteries. (1 col. pl.) *Amer. Jour. Ophth.*, v. 1, p. 12.

**Kirk, J.** Eye Changes in Trench Nephritis. *Brit. Med. Jour.*, Jan. 5, 1918, p. 7.

**McCaw, J. A.** Retinal Arteriosclerosis. *Colo. Ophth. Soc.*, Nov. 17, 1917. *Amer. Jour. Ophth.*, v. 1, p. 59.

**Rochon-Duvigneaud, A.** Functions of Rods and Cones; Indications for Physiologic Comparison. (7 ill.) *Ann. d'Ocul.*, v. 154, p. 633.

**Török, E.** Detachment of Retina. Reference to Müller's Resection of Sclera. *Trans. Amer. Ophth. Soc.*, v. 15, p. 74. *Arch. of Ophth.*, v. 46, p. 465.

### TOXIC AMBLYOPIAS.

**Robinson, J. M.** Blindness from Industrial Use of Four Percent Wood Alcohol. *Jour. Amer. Med. Assn.*, v. 70, p. 148.

### OPTIC NERVE.

**Belgeri, F., and Labat, J. C.** Sudden Blindness from Intestinal Hemorrhage. *Semana Med.*, Buenos Aires, 1916, p. 709.

**Birch-Hirschfeld.** Optic Neuritis with Empyema of Ethmoid. *Med. Klin.*, 1916, p. 427. *Arch. of Ophth.*, v. 47, p. 89.

**Fuchs, E.** The Lamina Cribrosa. *Graefe's Arch. f. Ophth.*, v. 91, pt. 3. *Brit. Jour. Ophth.*, v. 2, p. 50.

**Roenne, H.** Acute Retrobulbar Neuritis with Defect in Visual Fields. *Klin. M. f. Augenh.*, Feb.-March, 1916. *Arch. of Ophth.*, v. 47, p. 109.

**Spencer, F. R.** Optic Atrophy of Traumatic Origin. *Colo. Ophth.*, Nov. 17, 1917. *Amer. Jour. Ophth.*, v. 1, p. 61.

### VISUAL TRACTS AND CENTERS.

**Blum, H. N.** Hypophyseal Disease. *New Orleans Med. and Surg. Jour.*, v. 70, p. 583.



- Hine, M. L.** Recovery of Fields of Vision in Concussion Injuries of Occipital Cortex. (6 ill.) *Brit. Jour. Ophth.*, v. 2, p. 12.
- Hinshelwood, J.** Note on Congenital Word Blindness. *Lancet*, Dec. 29, 1917. p. 980.
- Holmes, G.** Disturbance of Vision from Cerebral Lesions. *Med. Press and Circ.*, v. 104, p. 490.
- Visual Localization and Orientation. *Roy. Soc. Med.*, Dec. 12, 1917. *Brit. Med. Jour.*, Dec. 22, 1917, p. 826.
- Kavelin, A. B., and Jackson, H.** Eye-grounds in Cyst of Hypophysis. *Surg. Gynec. and Obstet.*, v. 26, p. 61.
- Knapp, A.** Ocular Symptoms in Tumor of Frontal Lobe of Brain. (2 pl., 4 ill.) *Trans. Amer. Ophth. Soc.*, v. 15, p. 85. *Arch. of Ophth.*, v. 47, p. 83.
- Lamb, R. S.** Neuroma Embryonale of Left Lateral Ventricle of Brain with Double Choked Disc. (Dis.) *Trans. Amer. Ophth. Soc.*, v. 15, p. 212.
- Marie, P., and Chatelin, C.** Visual Disturbance due to Lesions in Intracerebral Optic Fibres. *Abst. in Jour. Nerv. and Ment. Dis.*, v. 46, p. 454.
- Mutschenbacher, T.** Visual Disturbance from Skull Injury. *Deutsch. med. Woch.*, 1916, p. 1471.
- Parker, W. R.** Sellar Decompression; Operation for Total Loss of Vision of One Eye and Partial Loss in Other. (3 ill. Dis.) *Trans. Amer. Ophth. Soc.*, v. 15, p. 91. *Arch. of Ophth.*, v. 46, p. 528.
- Poppelreuter, W.** Psychology in Injury to Head in War. Bd. I. Injuries to Occipital Region, 1914-16. *Leipsic, L. Voss.*
- Prezzolini, M.** Conjugate Deviation in Hemiplegia. *Abst. in Jour. Nerv. and Ment. Dis.*, v. 46, p. 453.
- Tyson, H. H.** Bilateral Inferior Hemianopsia. *Trans. Amer. Ophth. Soc.*, v. 15, p. 208.
- Uhthoff.** Lesions of Visual Tracts and Centers in Wounds of Skull. *Heidelberg Ophth. Soc.*, 1916. *Arch. of Ophth.*, v. 47, p. 112.

### COLOR VISION.

- Ferree, C. E., and Rand, G.** Unusual Areas of Color Blindness in Peripheral Retina. *Jour. Exp. Psych.*, 1917, p. 295.

### LACRIMAL APPARATUS.

- Stapleton, E. A.** Dacryocystitis. *Albany Med. Ann.*, v. 39, p. 22.
- v. Szily, A.** Pathology of Lacrimal Passages as Shown by Roentgenography. *Arch. of Ophth.*, v. 47, p. 89.
- Ten Doesschate and de Kleijn, A.** Orbital Abscess Complicating Disease of Lacrimal Gland. *Nederl. Tijdschr. v. Geneesk*, 1917, p. 564.
- Tooker, C. W.** Localized Suppuration of Canaliculus. *Amer. Jour. Ophth.*, v. 34, p. 369.

### LIDS.

- Kolb, O.** Plastic Operation on Lids and Conjunctiva. *Zentralbl. f. Chirurg.*, 1916, p. 617.
- McMillan, A. L.** Voluntary Eversion of Upper Lid. *Brit. Jour. Ophth.*, v. 2, p. 26.
- Maddox, E. E.** Operation for Ptosis. (2 ill.) *Brit. Jour. Ophth.*, v. 1, p. 358. *Amer. Jour. Ophth.*, v. 1, p. 52.
- Magalhaes, A.** Total Ankyloblepharon. *Brazil-Med.*, 1917, p. 264.
- Ramirez, E.** Cicatricial Ectropion. *Escuela Med. Mil., Mexico*, 1917, p. 4.

### ORBIT.

- Augstein, H.** Bilateral Pulsating Exophthalmos Caused by Bullet Wound. *Klin. M. f. Augenh.*, 1916, p. 484. *Arch. of Ophth.*, v. 47, p. 89.
- Dunhill, T. P.** Surgery of Exophthalmic Goiter. (4 ill.) *Lancet*, v. 193, p. 883.
- Franke, E.** Formation of Stump after Removal of Eyeball. *Zeit. f. Augenh.*, v. 35. *Amer. Jour. Ophth.*, v. 34, p. 380.
- Jickeli, C.** Acute Inflammatory Exophthalmos. *Abst., Arch. of Ophth.*, v. 47, p. 89.
- de Levie, D. J.** Thrombosis of Cavernous Sinus or Orbital Abscess. *Nederl. Tijdschr. v. Geneesk*, Oct. 13, 1917, p. 1412.
- Miller, C. S.** Exophthalmic Goiter. *New York Med. Jour.*, v. 106, p. 1210.
- Oehlecker, F.** Bone Prosthesis. *Zent. f. Chirurg.*, 1916, p. 617.
- Schwenk, P. N. K.** Operation for Contracted Socket. *Sec. on Ophth., Coll. Phys., Phila.*, Oct. 18, 1917. *Amer. Jour. Ophth.*, v. 1, p. 55.
- Shannon, J. R.** Aneurism of Internal Carotid Artery. (3 ill.) *Trans. Amer. Ophth. Soc.*, v. 15, p. 100. *Arch. of Ophth.*, v. 46, p. 518.
- Struycken, H. J. L.** Preparing Socket for Artificial Eye. *Nederl. Tijdschr. v. Geneesk*, 1917, p. 779.

### PARASITES.

- Pacheco, Luna.** Ocular Disturbance of Vision in Patients Suffering from Filariasis. *Guatemala Gen. Hosp.*, The Author, 1917.

### TUMORS.

- Bane, W. C.** Cyst of Dural Sheath of Optic Nerve. (4 ill.) *Amer. Jour. Ophth.*, v. 1, p. 17.
- Bell, G. H.** Primary Sarcoma of Orbit. (1 pl.) *Amer. Ophth. Soc.*, v. 15, p. 139. *Arch. of Ophth.*, v. 46, p. 427.
- Chance, B.** Cavernous Angioma of Orbit. (1 pl.) *Trans. Amer. Ophth. Soc.*, v. 15, p. 226.
- Clark, W. L.** Recurrent Neuroepithelioma Springing from Optic Nerve Treated with Electrothermic Coagulation. *Amer. Jour. Electrotherap. and Radiol.*, v. 35, p. 401.
- Fuchs, E.** Lymphangioma at Place of Cystoid Cicatrix. *Klin. M. f. Augenh.*, v. 56, p. 145. *Arch. of Ophth.*, v. 47, p. 104.



**Ischreyt.** Primary Sarcoma of Orbit with Anterior Adhesive Cyclitis in Luxated Eyeball. *Klin. M. f. Augenh.*, v. 46, p. 492. *Arch. of Ophth.*, v. 47, p. 106.

**Jackson, E., and Finnoff, W. C.** Sarcoma of Choroid; Secondary Changes. *Trans. Amer. Ophth. Soc.*, v. 15, p. 194. *Arch. of Ophth.*, v. 47, p. 72.

**Lamb, H. D.** Five Papillomatous Ocular Growths. (1 ill.) *Amer. Jour. Ophth.*, v. 34, p. 354.

**Ring, G. O.** Recurrent Neuroepithelioma. (1 pl. Dis.) *Trans. Amer. Ophth. Soc.*, v. 15, p. 217. *Ophth. Rec.*, v. 26, p. 437.

Epithelioma of Cheek and Lid Methods of Cure. *Sec. on Ophth.*, *Coll. Phys.*, Phila., Oct. 18, 1917. *Amer. Jour. Ophth.*, v. 1, p. 57.

**Sattler, R.** Unilateral Proptosis; Exploratory Operation; Ethmoid Osteoma. *Trans. Amer. Ophth. Soc.*, v. 15, p. 238. *Arch. of Ophth.*, v. 47, p. 68.

### INJURIES.

**Allport, F.** Removal of Steel Particles from Interior of Eye by Magnet. *New York Med. Rec.*, v. 106, p. 1205.

**Cords.** Causes and Prevention of Death After Orbital Wounds. Heidelberg Ophth. Cong., 1916. *Arch. of Ophth.*, v. 47, p. 89.

**Friedenwald, H.** Luxation and Avulsion of Eyeball During Birth. (1 ill.) *Amer. Jour. Ophth.*, v. 1, p. 9.

**Golseth, G.** Penetrating Wounds of Eyeball. *Jour. Lancet*, v. 38, p. 33.

**Lopez, C. J.** Dislocation of Lens. *Abst. Amer. Med. Assn.*, v. 70, p. 135.

**Miller, A. H.** Care of Patient's Eyes During Etherization. *Jour. Amer. Med. Assn.*, v. 70, p. 83.

**Roy, D.** Removal of Foreign Bodies from Eyeball and Orbit. (Dis.) *Trans. Amer. Ophth. Soc.*, v. 15, p. 56.

**Sattler, R.** Acute Tetanus After Penetrating Injury to Eyeball. *Trans. Amer. Ophth. Soc.*, v. 15, p. 234. *Arch. of Ophth.*, v. 47, p. 64.

**Teulières.** Action of Asphyxiating Gas on Eye. *Jour. de Méd. de Bordeaux*, v. 88, p. 247. *Jour. Amer. Med. Assn.*, v. 70, p. 132.

### PATHOLOGY.

**Howe, L.** Relation of Sex to Hereditary Eye Diseases. *Trans. Amer. Ophth. Soc.*, v. 15, p. 242.

### GENERAL DISEASES.

**Cohen, M.** Leukemic Manifestations in Eye. *Arch. of Ophth.*, v. 47, p. 61.

**Hunt, J. R.** Ocular Symptoms in Pseudoparesis. *Jour. Amer. Med. Assn.*, v. 70, p. 11.

**Larsen, H.** Arsacetin in Blindness. *Ugesk. for Laeger*, v. 79, p. 1695.

**Lapersonne, F. de.** Antityphoid Vaccine and Ocular Disease. *Arch. d'Ophth.*, v. 35, p. 449. *Amer. Jour. Ophth.*, v. 1, p. 54.

**Tooker, C. M.** Ocular Chemosis from Ethmoiditis. *Amer. Jour. Ophth.*, v. 34, p. 373.

**Poulard, A.** Treatment of Ocular Syphilis. *Presse Méd.*, Nov. 15, p. 63. *Jour. Amer. Med. Assn.*, v. 70, p. 61.

**Weekers, L., and Firket, J.** Ocular Manifestations of Spirochetosis Icterohemorrhagica. *Arch. d'Ophth.*, v. 35, p. 647. *Amer. Jour. Ophth.*, v. 1, p. 50.

### HYGIENE.

Advisory Committee on Care of Blind. *Brit. Jour. Ophth.*, v. 2, p. 45.

**Davis, A. E.** Care of Eyes. *New York Med. Jour.*, Dec. 29, p. 1208.

Eye-Strain and the Cinema. *Lancet*, v. 193, p. 904.

**Higgins, C.** Spectacles of Triplex Glass. *Lancet*, Jan. 1, 1918, p. 85.

**Pol, G. J. H.** Illumination for Fine Hand Work. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 66.

### PROFESSIONAL RELATIONS AND HISTORY.

British Army Standards of Vision. *Brit. Jour. Ophth.*, v. 2, p. 35.

Care of Blind. *Lancet*, v. 193, p. 906. *Brit. Med. Jour.*, Dec. 15, 1917, p. 802.

**Clapp, E. W.** Progress of Ophthalmology in 1917. *Boston Med. and Surg. Jour.*, v. 178, p. 56.

**Dunn, P.** Sir William Adams. *Brit. Jour. Ophth.*, v. 2, p. 1.

Eye Hazards in Industrial Occupations. *Natl. Comm. for Prevention of Blindness*, No. 12. New York City.

Literature for Blind. *Brit. Jour. Ophth.*, v. 2, p. 48.

Meeting of Ophthalmological Society of the United Kingdom, 1918. *Lancet*, Dec. 29, 1917, p. 977.

**Moore, T. W.** Changed Conditions in Practice of Ophthalmology and Otology Due to War. *Southern Med. Jour.*, v. 11, p. 48.

National Ophthalmological Advisory Committee. *Brit. Jour. Ophth.*, v. 2, p. 47.

Our New Journal. *Amer. Jour. Ophth.*, v. 1, p. 68.

Partial Loss of Sight in One Eye by Physician. (Medico-legal.) *Jour. Amer. Med. Assn.*, v. 70, p. 264.

**Risley, S. D.** Rise and Progress of Ophthalmology as a Specialty in Philadelphia. *Amer. Jour. Ophth.*, v. 1, p. 28.

**Roy, D.** Ophthalmology in 1917. *Med. Times*, v. 46, p. 21.

**Schweinitz, G. E. de.** Development of Science of Ophthalmology. *Univ. Penn. Lect.*, 1917, v. 4, p. 99.

**Trible, G. B.** Ophthalmology, A Specialty Ashore and Afloat. *Military Surg.*, Jan., 1918, p. 37.

Visual Requirements of Soldiers. *Brit. Jour. Ophth.*, v. 2, p. 40.

Welfare of Blind. *Brit. Jour. Ophth.*, v. 2, p. 29.

# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. I

MARCH, 1918

No. 3

## A SATISFACTORY OPERATION FOR MUSCLE SHORTENING OR ADVANCEMENT.

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BOSTON, MASS.

This paper describes with the help of a full series of illustrations, the form of operation preferred by its author, and gives the reasons for his preference for each part of the procedure. Read before the American Academy of Ophthalmology and Oto-Laryngology October 30, 1917.

The final solution of the problem of muscle shortening or advancement has not been reached—is not likely to be reached. As Poincaré has said, "We do not have two classes of problems in science, those that are solved and those that are not, we have only problems *more or less* solved." I say this that you may not

days before hand. Superficial anesthesia is, of course, easily obtained by dropping 2 to 4 percent cocain solution into the conjunctival sac. This makes the conjunctival incision and isolation of the muscle painless; but when the muscle has been raised on the hook, very little pulling will suffice to cause pain. Once the patient has been hurt, he is made nervous and apprehensive and becomes harder to manage.

To operate satisfactorily, the surgeon must be able to make any manipulations he may find necessary without hurting. If the solution of cocain or other anesthetic is injected subconjunctivally, the

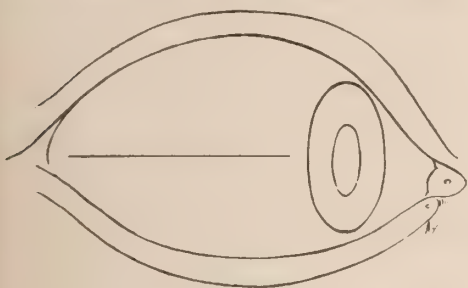


FIG. 1.

Longitudinal conjunctival incision from near cornea toward canthus. (Lancaster.)

think I am attempting to utter the last word on advancement operations. My object has been to find among the multitude of proposed methods the most satisfactory procedures.

For *anesthesia* I prefer local to general. Some patients will be found who are too excitable and uncontrollable for satisfactory operation by local anesthesia. The number of these will be greatly reduced if the surgeon really does not hurt the patient, and if adequate sedatives are administered some hours or

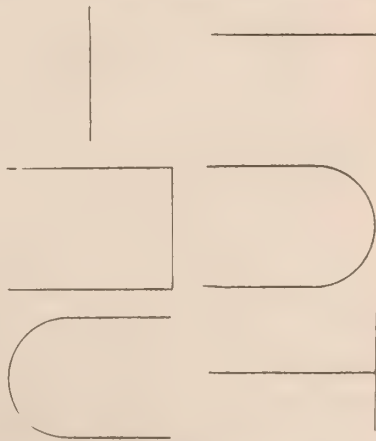


FIG. 2.

Various forms of transverse incisions that too often leave an ugly blemish. (Lancaster.)

edematous infiltration, even if the eye is massaged, is sufficient to interfere with the operation. The most satisfactory way is to inject the novocain or cocain solution beneath the capsule of Tenon, pushing the needle in about 20 mm. alongside the muscle. One, or at the most 2, c. c. of a 1 percent solution of

trouble. The chief advantage is in the cosmetic effect.

With the commoner more or less transverse incisions (Fig. 2), there is too often an ugly blemish, lasting for weeks or even months, where the conjunctiva covering the site of operation is thickened, hyperemic and somewhat



FIG. 3.

Conjunctiva thickened, hyperemic and puckered, after transverse incision. (Lancaster.)

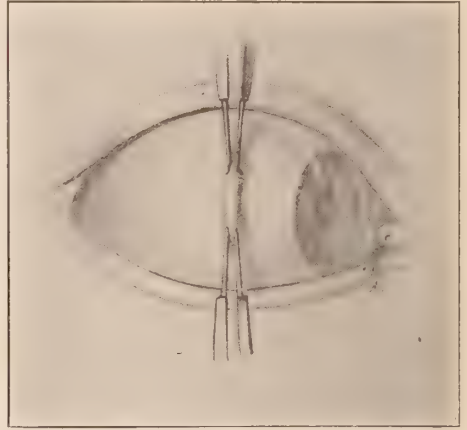


FIG. 4.

Fold of conjunctiva raised by forceps to make conjunctival incision.

novocain, or a smaller quantity of  $\frac{1}{2}$  percent cocain, always with a small amount of suprarenin or adrenalin added, will produce so complete anesthesia that when the muscle is lifted on the hook and pulled upon no pain will be felt if manipulations are reasonably gentle. When the patient finds that no pain is felt, he quiets down and remains a satisfactory subject; but once a real twinge is felt, the patient becomes aroused, nervous, apprehensive and hard to manage.

The most satisfactory *conjunctival incision* in my experience is a longitudinal straight incision from near the cornea to near the canthus. (Fig. 1.) This gives a satisfactory exposure of the field, provided the two lips of the wound are retracted either by the assistant or by a temporary suture through each with a forceps snapped on each as a weight. The line of incision is parallel to the chief blood vessels, and so the hemorrhage is less, and the nutrition less interfered with during healing. These are unimportant considerations, because the hemorrhage and healing usually give no

puckered, in marked contrast to the smooth adjoining conjunctiva. (Fig. 3.) Sometimes this blemish is visible for years and may never disappear. It is, therefore, an important consideration. This blemish is not an inevitable consequence of the various transverse incisions or flaps. It is, however, much

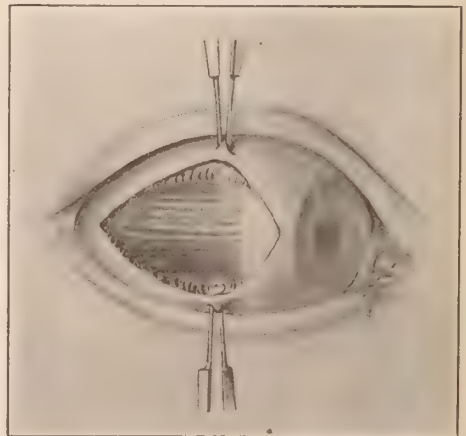


FIG. 5.

Conjunctiva retracted and undermined.



more difficult to secure a satisfactory, smooth and good looking scar with that form of incision. Sometimes the operator has been known to cut too deeply in making his conjunctival incision because he picked up too much tissue with his forceps including muscle as well as con-

The surgeon releases his hold of the conjunctiva and picks up a vertical fold of capsule of Tenon just beyond the margin of the muscle, where it is exposed by the assistant, who still retains his hold of the conjunctiva (Fig. 6). The capsule is cut, making a longitudi-

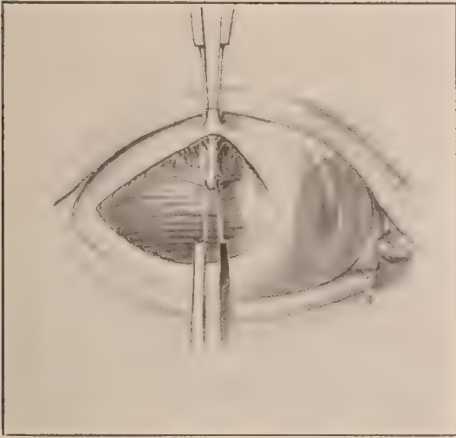


FIG. 6.

Conjunctiva still held by assistant. Capsule of Tenon raised by surgeon's forceps to incise.

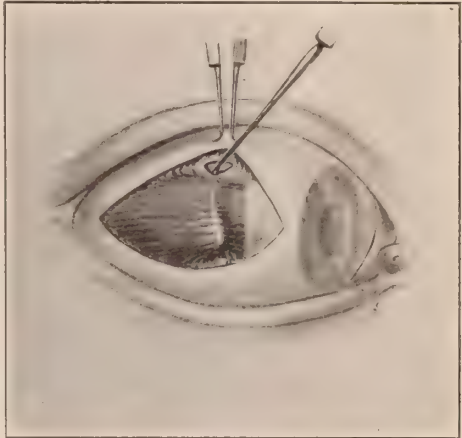


FIG. 7.

Surgeon's forceps laid aside. Hook introduced beneath the tendon raising capsule at lower margin.

junctiva. If the incision is longitudinal, no harm is done, because it is parallel to the muscle fibers; whereas, such an inadvertent cut across the muscle fibers would be a serious mistake. Hence, if a transverse incision is chosen, it is safer to make it anterior to the tendon insertion.

#### STEPS OF OPERATION.

To make this longitudinal conjunctival incision, the surgeon seizes the conjunctiva about as far from the cornea as the insertion of the muscle and near its upper or lower border, with one blade of the forceps nearer the cornea and one nearer the canthus, thus raising a vertical fold, transverse to the line of the muscle. The assistant seizes this fold in the same way near the opposite border of the muscle, 4 mm. from the surgeon's forceps (Fig. 4). This fold is cut with the scissors and the incision extended toward the cornea and toward the canthus. Without releasing the forceps, each flap is undermined as far as the full width of the muscle (about 10 mm.), or approximately the width of the cornea (Fig. 5).

nal opening. Still holding the fold of capsule in his forceps, the surgeon lays aside the scissors and takes a medium-sized muscle hook, which he inserts thru the opening in the capsule. If the opening has been properly made, the hook is inserted with great ease and passed under the muscle until its point is

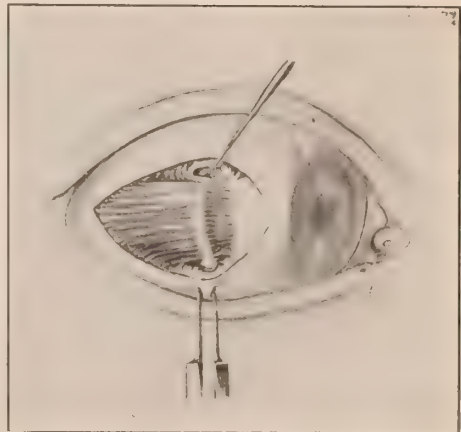


FIG. 8.

Capsule slit at lower margin of tendon permitting hook to come through.

made to lift the capsule at the opposite border of the muscle (Fig 7). The assistant lifts the conjunctiva away from this border of the muscle, and the surgeon transfers the hook to the left hand and with the scissors snips an opening in the capsule over or alongside the hook, permitting it to come through (Fig. 8).

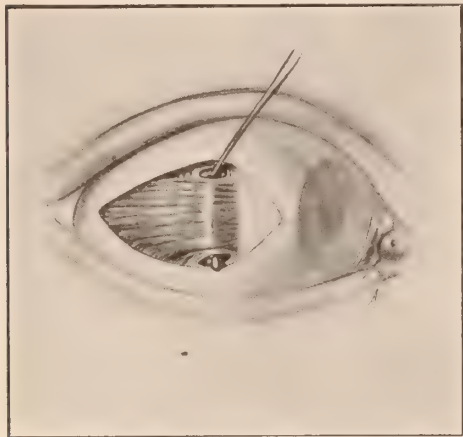


FIG. 9.

Hook fully introduced, point emerging through lower opening in capsule.

Before enlarging these two openings, thus isolating the muscle, make sure that the entire width of the muscle is included (Fig. 9). Not infrequently, the incisions, one or both, are made too near the median line of the muscle and so do not include all the fibers. Remember that the width of the muscle is nearly equal

to the diameter of the cornea, and not one-half that width, as often shown in illustrations.

The two incisions through the capsule should be prolonged by cutting with the scissors (Fig. 10), rather than by introducing two hooks and tearing (Fig. 11).

How long to make these incisions de-

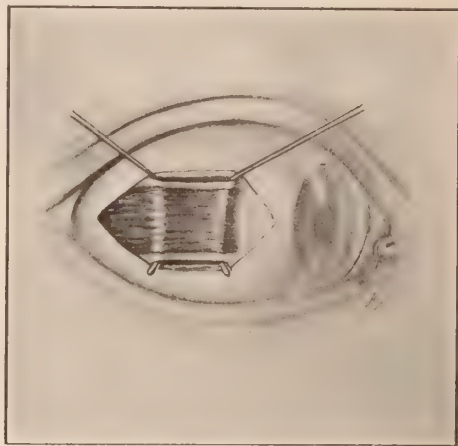


FIG. 11.

Both hooks used to raise tendon ready to introduce the whip stitch.

depends on how much the muscle is to be shortened.

One can stop here and tenotomize the antagonist in the usual way, or this can be done later.

The *suture* through the muscle to be shortened is next placed. The most satisfactory hold is obtained by a *whip stitch*. A double armed silk suture, not



FIG. 10.

Method of isolating tendon by incision with scissors along each edge.

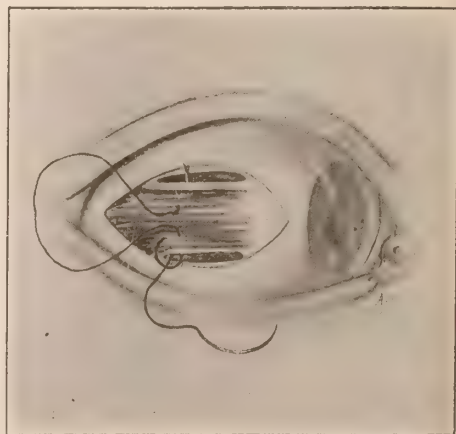


FIG. 12.

Introduction of whip stitch. Upper needle just entered, lower end passed around bundle of tendon fibres.

too fine, is used. One needle is passed thru the muscle from the outside toward the scleral surface about 2 or 3 mm. from one margin of the muscle and as far back from the insertion as is thought necessary to obtain the desired shortening (Fig. 12). The same needle is passed again just back of the point where it was inserted the first time, thus surrounding a bundle of fibers about one-fourth to one-third the width of the muscle with a whip stitch. In the same way, a whip stitch is passed around the corresponding

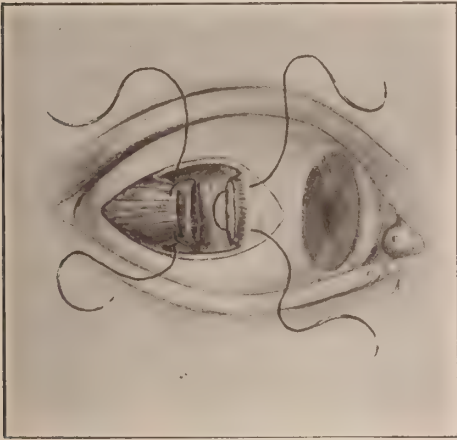


FIG. 13.

Whip stitch introduced security stitch passed through stump of tendon.

bundle of fibers along the other border of the muscle (Fig. 12). The operator now has a secure hold on the muscle, and can cut the tendon.

An alternative and better method is to seize the muscle with Prince's forceps near its insertion, and cut it off before inserting the suture. This can then be very easily done because the muscle can be held up away from the eyeball, where it is easy to get at. If the patient is told to look toward the side of the antagonist, the muscle will be relaxed, and more easily drawn up by the forceps.

It is well to leave a stump of about 1 mm. rather than cut the tendon clean off close to the sclera. This stump affords a secure hold for the forceps in fixing the globe when passing the stitches in the sclera later on.

It also affords an easy anchorage for an additional *security stitch* to hold the

muscle. This should be placed next. Use a double armed suture of silk, not too fine. It may well be of different color from the first one. Pass the needles from behind and beneath the stump forward through the insertion, one emerging 3 mm. from the upper margin, the other 3 mm. from the lower margin of the tendon; and a little nearer the cornea than the line of insertion. The loop of the suture is on the scleral surface of the tendon (Fig. 13). Next pass the needles through the muscle from the scleral surface outward about 3 mm. farther back than the whip stitch and about 3 mm. from the margin of the muscle (Fig. 14). Then pass the needles thru the conjunctiva about 2 mm. from the margin of the incision and about as far from the cornea as the insertion of the tendon. When the muscle has been pulled forward and tied in place by the first or whip stitch, this security stitch will be tied, thus binding the muscle down on the tendon stump and closing the conjunctival incision at the same time. Meantime, lay these threads one above and one below the eye on the sterile cloth with which the face and head are covered.

Next, pass the needles of the first suture, which is attached to the muscle, thru the superficial layers of the sclera near the cornea. The most satisfactory way to do this is to fix the globe with a fixation forceps, which securely grasps

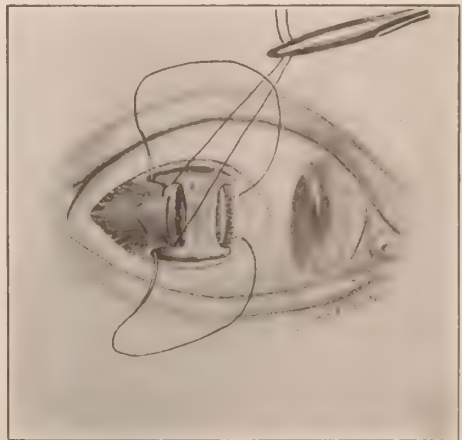


FIG. 14.

Whip stitch held aside needles of security stitch passed through muscle behind whip stitch.



the tendon stump left for that purpose. Enter the needle between the tendon insertion and the cornea, preferably nearer the cornea, where the sclera is thicker and where an accidental penetration of the eyeball would be least disastrous. Push it toward the cornea, i. e., away from the tendon, nearly parallel to the direction of the muscle fibers (Fig. 15). When the needle is pushed in this direction and the eyeball held firmly by the tendon stump, there is no tendency for

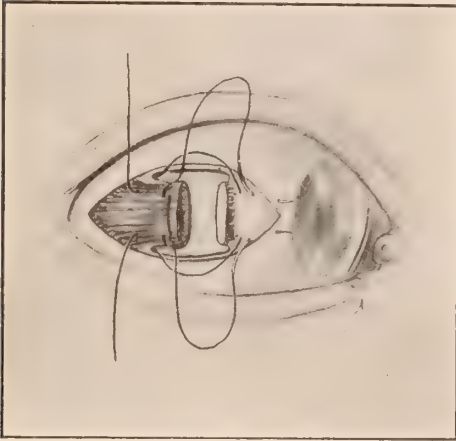


FIG. 15.

Security stitch in place. Needles of whip stitch introduced into sclera towards cornea.

the eyeball to roll around, and it is much easier to make sure that the needle goes thru a few superficial fibers of the sclera, getting a firm anchorage without going too deep; and without tearing out from not going deep enough, or from twisting, rolling movements of the eyeball. The most satisfactory place for the needles to emerge is through the conjunctiva about 1 mm. from the corneal margin, the one 2 mm. above and the other 2 mm. below the original longitudinal incision in the conjunctiva. When the suture is tied, the knot will be outside on the surface of the conjunctiva.

The most satisfactory way to tie this knot is to have the assistant seize the globe by the stump of the tenotomized antagonist with one hand and the end of the tendon to be advanced held in Prince's forceps with the other, and while rotating the globe toward the muscle to be advanced with the first hand, pull the muscle forward with the other. The

surgeon pulls gently on the ends of the suture, taking up the slack, and then more firmly until the muscle is brought as far forward as is desired, when a single knot is tied. Unlike the Reese, Verhoeff and other similar methods, it is not necessary, in order to get a surely holding suture, to pull it forward until the point where the suture is attached to the muscle is right up to the point where the suture is attached to the sclera, since the security stitch will tie the muscle down on to the sclera.

The eyes are now inspected, and if the effect is satisfactory the second half of the knot is tied firmly. If not enough effect has been produced, the assistant again grasps the muscle and the stump of the antagonist, and rotates the eye toward the muscle while pulling the muscle gently forward, while the surgeon pulls the suture more tightly. If the effect is insufficient even when the point where the stitch is fastened to the muscle is drawn close up to the point where the stitch enters the sclera, there is no use in pulling any more. The suture was not applied to the muscle far enough back, and must be done over again, a matter of a very few minutes and very little trouble when the anesthesia is satisfactory.

After the whip stitch is tied, the security stitch is tied. Usually, this suffices to close the conjunctiva. Good apposition of the edges favors prompt union and good cosmetic appearance, so

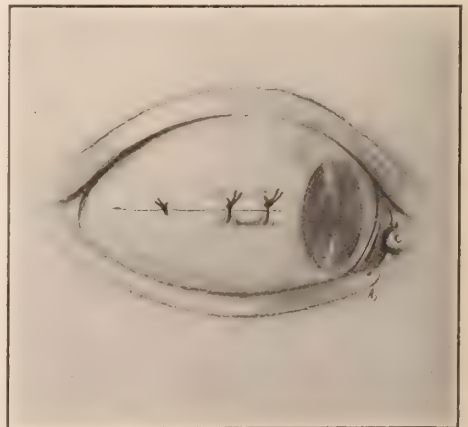


FIG. 16.

Operation completed, stitches tied. All knots on the surface.

that if necessary other conjunctival sutures should be applied. (Fig. 16.)

If necessary, the opening in the conjunctiva made in tenotomizing the antagonist should be closed with a suture. If an over effect is feared, as shown by limitation of motion, a regulating stitch may be past through the tendon of the tenotomized muscle and thru its insertion, and too free a tenotomy regulated.

Time would fail to enumerate the various alternative methods proposed and the reasons for their rejection. In some cases the choice is not easy, since the superiority of the method I have selected or devised is not sufficiently great. Thus, the Worth method makes fast to the muscle by a suture which is tied in a firm knot outside the conjunctiva. This is a well-trying, reliable method. It is rejected in favor of the whip stitch, because the latter is simpler, is entirely secure and does not include the conjunctiva.

The methods which simply pass the suture through the muscle once on each side with no knot and no whip stitch are not reliable, since the stitch so easily cuts its way along between the muscle fibers. If no strain is put on this kind of a stitch until it is tied down on the sclera or stump of tendon, as in Jackson's, Verhoeff's, Reese's and others, the hold is fairly secure. But it has been known to slip—due, no doubt, to faulty technic in tying the knot. This form of suture is added to the primary suture as a security suture in the operation here described. Virtually the same thing has been recommended by Butler, of England.

One great disadvantage of the tying-down suture of Reese, Verhoeff, Jackson, et al., is that there is virtually no latitude of adjustment in tying the suture—only in placing it. One must decide just how far back to place the suture in the muscle, and then tie the muscle down with that point closely applied to the sclera where the stitch enters that tissue. It is secure only when drawn firmly and so no adjustment is available. Sometimes a little adjustment is very desirable, but I do not wish to imply that one can expect to adjust the position of the eye during the operation even under local anesthesia, far less under narcosis, and expect the same balance to obtain a

few days later. The position depends on too delicate a nervous adjustment. This is put out of gear by the traumatism of the operation and the anesthesia.

The method of scleral anchorage advised is not the only good one, of course. It has these advantages: It is most easy to apply because the eye can be held so firmly by the tendon stump, provided the direction of the stitch is away from the tendon towards the cornea. Since the two stitches are tied in one transverse knot, the pull is divided between them and we have as strong a hold, tested by Bishop Harman's postcard method, as in the transverse stitch with the knot longitudinal.

An important consideration is the fact that so little strain is put on the tissue when the suture is being pulled up firmly in tying, since the direction of the pull by the surgeon is along the line of the thread toward the cornea, whereas when the thread passes transversely, as in many operations, the pull has to be deflected as by a pulley.

The two longitudinal stitches through the sclera afford a reliable hold even without the security stitch, provided they are well placed and well tied. The latter is added to provide for the occasional imperfectly applied stitch and to make the attachment so secure that a minimum period of bandaging will be required. It also makes unnecessary the curetting of the surfaces of muscle and sclera, or their cauterization as proposed by Maddox.

I do not approve of the French and German plan, following Landolt, of keeping the patient in bed with a binocular bandage for a week, avoiding even a look at the eyes for fear the stitches will not hold. On the other hand, I prefer at least 24 hours in bed and a day or two more with both eyes closed, the operated eye being covered for a week or ten days. The conjunctival stitch may be removed on the second or third day. The security stitch may be removed on the sixth or seventh day, the primary stitch should not be removed before the tenth day. It comes away easier the longer it is left.

REASONS WHY THIS METHOD IS AS SATISFACTORY AS ANY HERETOFORE OFFERED.

(1) Perfect anesthesia.

- (2) Hold on muscle is doubly secure.
- (3) Hold on the sclera is doubly secure.
- (4) The scleral stitch is inserted in the easiest way.
- (5) The primary stitch is adjustable, can be pulled tighter as trial shows necessary.
- (6) No special instruments required.
- (7) The security stitch secures close and effective apposition of muscle and sclera.
- (8) The security stitch stimulates plastic activity at the point where union of muscle and sclera is to take place.
- (9) The conjunctival incision closes with the best cosmetic result.
- (10) No buried stitches and no unsightly folds or lumps to mar the cosmetic result during the early weeks of convalescence, *when the patient's attention and that of his friends is most closely concentrated on the eye.*

Many operators, especially those with large experience, have already adopted some method of doing an advancement, resection or tucking which is satisfactory to them. It is not to be expected that they will abandon a well tried and satisfactory method for a new one, however much is claimed for it. Those who have not yet found a satisfactory method, and they number not a few, are urged to give this a trial, comparing it with other methods, and see if the result is not satisfactory.

## SECONDARY OPTIC ATROPHY DUE TO "GASSING."

MAJOR W. E. KERSHNER, M. D.

MEDICAL RESERVE CORPS, U. S. ARMY.

Report of a case giving some of the late effects of repeated exposure to the poisonous gases that constitute one of the dangers of modern warfare.

The case reported herewith was seen in the service of Major Casey Wood, Chief of the Division of Ophthalmology at the Base Hospital, Camp Sherman, Ohio.

The remote effects of gas poisoning have been little studied in America. Such cases as are at our disposal for study are reports of foreign observers. The clear history and findings make this case of special interest because of the future bearing it will have upon ocular defects which return to us from the front.

E. L., age 23, white, American, a citizen of the United States, enlisted in the Canadian service in August, 1914. He was assigned to the 13th Battalion, Infantry. At his examination for enlistment his vision was normal in the right eye, but reduced in the left. He could read the fourth line on the chart with the left eye, he says. This, if a fact, brings the left eye vision not lower than 20/50. He attributes the reduced vision in this eye to a blow which he received

when about seven years of age. He has worn glasses from his tenth year, and denies ever having had other trouble with the eyes than a refractive error until after his second gas experience in France.

Our patient landed in France on February 25, 1916, and was immediately detailed in the bombing section of his regiment. He was sent into the front line trenches on March 2, 1916. At this time his government had not completely equipped all regiments with gas masks. March 6, 1916, he experienced his first gas attack, the effects of which were transitory and consisted of nausea and vomiting with dizziness, which lasted from ten days to two weeks. He describes the gas as a greenish cloud in both instances.

The second "gassing" occurred on May 22, 1916, at about dusk, at which time it was impossible to see the approach of the gas and take such measures as they could to prevent its full effects. The concentration was probably not great, as



the case history shows. The first effects noticeable were irritation of the throat with shortness of breath, not severe. The worst immediate effect was the inability to see clearly. "It seemed like a dense haze was about every object," he says. There was also nausea most of the time, with a sensation of floating, shortness of breath, and a smothering sensation which was not constant. During this stage he was taken to the dressing station, where consciousness was lost. This at about 7:30 p. m.

Consciousness was regained between three and four hours later in the Field Hospital, at which time a splitting headache was the most notable symptom. This was accompanied by severe pain and aching of the left arm and leg, which were very weak. It was possible to move them, only after great effort, but there was no strength in the muscular move-

ments. Movement was accompanied by pain for the first weeks. This condition of the left side gradually and very slowly improved until he was able to discard his cane in May, 1917. I may here add that there are no evidences of weakness on the left side at present. Upon regaining consciousness, he was only able to distinguish light from darkness. This condition lasted about seven weeks, by which time objects had become discernible, and in another three weeks vision in the right eye had improved to about what we find it. The left eye failed to improve beyond the ability to discern objects. In this condition he was returned to Canada, discharged from the service, and returned to his home in the States, only to be picked up by the draft.

We find at present the following clinical history. He entered the Base Hospital complaining of left frontal and tem-

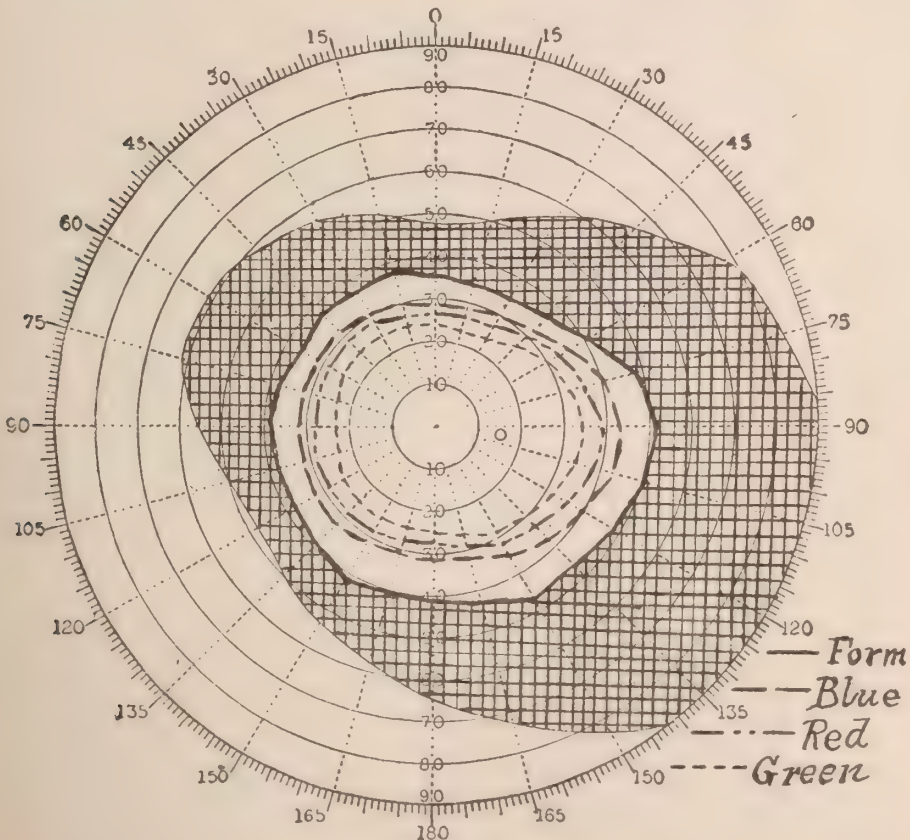


FIG. 1.

Field of Vision for right eye in case of gassing, showing contraction for both form and color fields. (Kershner.)

poral headaches which are more marked in hot or damp weather.

Family history is negative. His father and a brother are in the Canadian army at present. Personal history: Illnesses of childhood only, and slight attacks of rheumatism in damp cold weather, with some stiffening of the joints, probably due to an old gonorrhea of some years standing, which had bothered him a little before the exposure incident to his service in France. Personal history otherwise negative.

Physical examination was reported negative by the medical service. Ear, nose and throat examination reported negative by that department. Examination of the ethmoid cells was made with special care. The emunctories are normal.

Returning to the ocular condition, we find the conjunctiva normal, cornea clear, irides blue, react to light, accommodation and convergence promptly. Reaction to light directed into left pupil somewhat less pronounced than when directed into the right. Ocular movements normal in all directions. Vision, right eye, 20/40, left eye, hand movements at 50 cm. The right eye with a plus 1.75 D. sphere gives 20/30 vision. It is not possible to improve the vision of the left eye.

The field of vision for the right eye, as indicated on the accompanying chart, revealed contraction for form as well as for colors (blue, red and green), with a very slight enlargement of the "blind" spot. It is not possible to get any type of field for the left eye.

Ocular efforts are followed now by marked distress of the right eye with photophobia and blepharospasm.

Ophthalmoscopic examination: Right eye, media, clear, disc oval, axis  $75^{\circ}$ , marked pigment ring to the nasal side of disc, scleral ring pronounced to the temporal side, with secondary pigment

areas up and to the temporal side, two veins width from the scleral ring. Physiologic excavation of normal size, but seemed partly filled with a transparent substance or tissue. The whole disc is pale. Refraction of the disc plus 2.50 D., that of the superior and inferior temporal arteries, taken three disc diameters from the disc, is plus 1.50 D. Macula normal. Periphery of fundus normal.

Left eye, media clear, disc oval axis  $105^{\circ}$ , marked pigmentation in area about the whole disc which is very pale, with a shallow physiologic cup. The nerve head is very prominent with an evident striated new tissue formation. Refraction of the nerve head is plus 5.50 D. while that of the superior and inferior temporal arteries three disc diameters distant from the disc is plus 4.00 D. The atrophy is more marked in the left than in the right eye. Macula normal. There are a few cholestrin deposits in the retina down and out from the macula. Periphery normal.

Whether secondary optic atrophy follows neuritis, extending to the optic nerve from a gas ethmoiditis, as Finch suggests (*Lancet*, Nov. 6, 1915), is purely speculative. As yet we have too little data upon which to venture an opinion. The effects of "gassing" may prove more far reaching than we expect, extending even to the brain tissue, and affecting the nervous stability and mentality of the subjects.

One thing is sure. Our case presents evidence of neuritis, and that traceable directly to gas. Whether that neuritis was caused by the effects of the gas upon the vaso-motor system, whether it was due to direct blood changes, or whether it gained entrance thru the naso-pharyngeal area is of less importance than the actual results; which we will have to face if degeneration of the visual apparatus proves a common end result of gas toxemia.

## LATENT NYSTAGMUS.

MAX W. JACOBS, M. D.

ST. LOUIS, MO.

Report of a case of this unusual form of nystagmus, with account of some of the explanations offered for it. Read before the American Academy of Ophthalmology and Oto-Laryngology, October 29, 1917.

During the past 45 years occasional cases of nystagmus have been reported which are characterized by the fact that the essential eye phenomenon appears only when one eye is covered or binocular vision interfered with. The eyes of some of these patients did show occasional nystagmoid movements with both open, but in such the nystagmus was intensified by covering one of them. Fromaget has suggested calling this condition Latent Nystagmus, because of its analogy to latent strabismus. Dorff,<sup>1</sup> in 1914, described several cases which come in this category, and has reviewed the literature up to that time. With the newer methods of ear examination, doubtless some of the earlier reported cases could have been excluded from this classification, but the more recently examined patients have enjoyed the benefits of such newer methods, and are reported as otologically negative. Disturbances of motility, especially convergent strabismus, are frequent in these cases, and not rarely some form of nystagmus has been found in the ascendents and descendents.

My patient is a boy of 14 years, who consulted an oculist because of occasional poor vision when reading.

Ophthalmometer shows astigmatism, R. and L. + 0.50 D. axis 90°.

Vision: R. 18/70 to 18/40.

L. 18/200 to 18/100.

Binocular 18/20 +.

There is no strabismus. The patient has been seen repeatedly, and occasionally nystagmoid movements have been detected with both eyes uncovered. But on the other hand there have been visits to the oculist during which the boy was subjected to repeated examinations and during which such movements have been absent. On covering either eye marked horizontal nystagmus occurs. The ex-

cursions are of equal length and duration. The phenomenon is most marked in the left eye and both eyes almost immediately become quiet again when the obstruction is taken away. Retinoscopy after using homatropin shows one diopter of hypermetropia with no astigmatism. With the corresponding correction there is, of course, practically no change in vision. General examination and a blood Wassermann are negative. The otologist after making labyrinthine tests, reports the ears normal and the eyegrounds show no abnormalities.

As Dorff has stated, it is assumed today that there is a supranuclear tonic association center, which controls the ocular movements associated with binocular seeing. The center must be connected with the cortex, cerebellum, vestibular apparatus and nuclei of the eye muscles. Coppez,<sup>2</sup> one of the investigators along this line, assumes that there is a rhythmic or clonic center from which arise nystagmoid movements. This clonic center is ordinarily controlled by the tonic center. In my patient, as in the first case described by Dorff, no peripheral cause for the disturbance in equilibrium could be found; and I believe we can assume that we are dealing with an underdeveloped tonic association center which does not sufficiently inhibit the clonic center.

Fromaget<sup>3</sup> tried to explain latent nystagmus on the theory that the tonic center which controls normally all eye movements requires the stimulation of both retinæ to retain control over the antagonistic clonic center. My observations make me side with Dorff, who pointed out that interference with the vision of one eye by means of a strong convex lens did not prevent the appearance of nystagmus. Both retinas were subjected in this experiment to a light stimulus and yet the nystagmus ap-



peared. I have frequently held a screen in front of one eye of my patient in such a way that a reasonable amount of light was admitted to that eye (the other eye fixing). The horizontal nystagmus appeared immediately. These facts, it seems to me, make more tenable the suggestion of Dorff that in these patients, most of whom are strabismic, some fusion stimulus is still transmitted to the tonic association center and tends to maintain equilibrium. The placing of an obstruction before either eye, even if it does not cut off all light, interferes with even this minimal fusion; and the tonic loses control of the clonic center. This theory receives even stronger support in my case, since the boy does not squint.

It has been suggested that we can be of service to these patients, particularly when we see them during childhood, by advising against occupations which require monocular vision. One of Dorff's

patients noted his affliction when he first tried to fire a gun. As soon as he closed one eye to aim, the target became indistinct. Another patient was suddenly given work to do which required monocular vision for the greater part, and found that she was unable to see objects clearly under such conditions. Operations for strabismus have been of cosmetic value only. Stereoscopic exercises to strengthen binocular fixation have been suggested by Fromaget, for those who still retain good binocular vision. The loss of an eye in one of these patients would bring up the question whether greater damages should be assessed than after enucleation in a patient not suffering from this anomaly.

The entire subject is still largely theoretical, and the solution of its problem depends on our acquiring a better knowledge of the centers which control motility.

#### BIBLIOGRAPHY

1. H. Dorff. *Klinische Monatsblätter f. Augenheilk.* October-December, 1914.
2. Coppez, H. *Société Française d'Ophtalmologie*, 1913, p. 1.
3. Fromaget, C. and H. *Annales d'Oculistique*, v. 147, p. 344.

### CONGENITAL PARALYSIS OF THE EXTERNAL RECTUS MUSCLE.

BY WILLIAM H. CRISP, M. D., OPH. D.

DENVER, COLORADO.

A review of the literature of congenital palsies of the ocular muscles with report of two new cases. Read before the Third Colorado Ophthalmological Congress, August 9, 1917. With discussion and bibliography.

Congenital paralysis of one or more of the muscles of the facial region, while not perhaps to be regarded as among the common congenital defects or anomalies, has been made the subject of fairly frequent reports in the literature. According to Lennon,<sup>1</sup> who in 1910 reviewed the subject from the point of view of the neurologist, presenting also records of three personal cases, the literature of the past thirty years contained less than fifty instances of congenital oculo-facial defects. All three of Lennon's cases had defects in the muscles of the face and of the eyes at birth. Other anomalies

were present, including club foot, and a deformity of the ear.

As regards the eye, the musculo-nervous defect which has probably been most frequently observed and reported is that of congenital ophthalmoplegia. Writing in 1910, Webber<sup>2</sup> had been able to find seventy-four cases of this condition in a survey of the literature for thirty years. Of these seventy-four cases, forty-five were in males and twenty-seven in females, the sex in two other cases not being stated.

As with many other congenital defects, congenital ophthalmoplegia shows a

marked disposition to be a family and frequently a hereditary disease. Out of the seventy-four cases collected by Webber, thirty-three belonged to only nine families, the condition sometimes running thru three generations. Cooper,<sup>3</sup> on investigating the case of a young man who came to him with this condition, found that a great-grandfather, a great uncle, a grandfather, an uncle, the father, and a brother had been or were similarly affected. Of this family no female member had shown the condition, and in every instance the trouble had existed from birth. The eyeballs were immovable, and there was also more or less complete paralysis of the elevator of the upper lid.

In some of the cases reported a number of the extrinsic eye muscles have been involved at the same time, while other muscles have more or less completely escaped. This was the situation in three cases reported by Gebb and Voss.<sup>4</sup> In the first, the following muscles were completely paralyzed: on the right side the elevator of the upper lid, both obliques, and the internal and superior recti; on the left side the superior oblique, and the superior and inferior recti. The preserved muscles were on the right the abducens and the inferior rectus, and on the left the elevator of the upper lid, the abducens, the internal rectus, and the inferior oblique. In the second case the paralyzed right muscles were the elevator of the upper lid, the abducens, the inferior oblique, the superior and inferior recti: the left paralyzed muscles were the three recti and the inferior oblique. The preserved muscles were on the right the superior oblique and the inferior rectus, on the left the abducens, the inferior oblique and the elevator of the upper lid. In the third case the elevator of the upper lid, the abducens, both obliques, and the superior rectus were paralyzed on the right side; and on the left side the superior and inferior recti and the inferior oblique. On the right side the internal rectus, and on the left side the abducens and the superior oblique were incompletely paralyzed. The sound muscles were on the right the inferior rectus, and on the left the eleva-

tor of the upper lid and the internal rectus.

In a fair number of cases the paralysis has involved an individual muscle alone. This individual muscle has usually been the external rectus, but a few cases have been recorded in which an individual of the group of muscles supplied by the common motor oculi has been the one affected. For example, Mittendorf<sup>5</sup> and McDannald<sup>6</sup> both report cases in which there was apparently complete absence of the inferior rectus. In the two cases reported by von Imre<sup>7</sup> the muscles involved were the elevators of the upper lids and the superior recti, all of which were completely paralyzed, and the internal recti, which were weak.

As regards the anatomic foundation for the paralysis, differences of opinion have been expressed. It may be that these varying opinions are not contradictory, but correspond each to the actual state of affairs in individual cases. Möbius,<sup>8</sup> writing in 1892, concluded that congenital oculo-facial muscle defects were due to what he called "Kernschwund," that is a disappearance of the nucleus. This view has, however, been strongly opposed by other authors, notably Kuhn,<sup>9</sup> who argues that a primary muscular aplasia is the cause of the condition. However this may be, definite absence of the muscle itself has apparently been clearly demonstrated in a number of cases. Statements to this effect have been made by Schenkl,<sup>10</sup> Mittendorf,<sup>5</sup> Coover,<sup>11</sup> and others. In some cases the muscle has been found to have been replaced by a fibrous band.

The first report of a case which had been studied from the point of view of the presence or absence of the nucleus was by Heubner,<sup>12</sup> in 1900. The patient was two years of age, and had from birth a paralysis of the external eye muscles, a paralysis of the face well marked on the right and less marked on the left side, and an atrophy of the left anterior half of the tongue. Histologic examination showed complete absence of the cells of the abducens nuclei. The facial and hypoglossal nuclei on the left side were practically absent, and on the right side the facial nucleus was represented by a diminished number of normal cells. The

nerve roots were very small or absent. As bearing on the general question, Lennon quoted the experience of Oversteiner. This investigator found intact anterior horn cells in the cord of a man who had lacked from birth most of the lower muscles of the right shoulder girdle and of the right side of the neck. Reference is further made by Lennon to the fact that Ziehen demonstrated a patient in whom a defect of one of the large body muscles coexisted with ocular and facial defects. Similar cases had been reported by Schmidt and Israel. From the presence in two of his own cases of other defects of mesodermic origin, Lennon argues that in them the ocular defects were rather of mesodermic or muscular origin than of ectodermic or nuclear. In Mittendorf's and Coover's cases the absence of the muscle was seemingly clearly shown at operation.

In an exhaustive paper on the general subject of congenital muscular defects, Abromeit<sup>16</sup> classifies as follows the varying conceptions of the anatomic nature of these defects in different patients: (1) those cases in which no embryologic foundation for the muscle ever existed, so that it is not represented by any tissue whatever; and (2) those in which the muscle was laid down, but underwent degeneration during the embryonic period, because the normal connection with the nerve or central organ was never established, these cases presenting remains of their earlier independent existence in the form of tendinous and fatty tissue. The second group may owe the failure of trophic influence on the part of the central organ or nerve either to a mere lack of union of the nerve with the muscle, to lack of development of the nerve, or to defective development of the cells of the anterior horn or nucleus as the case may be.

Lundsgaard<sup>13</sup> saw total paralysis of the external rectus in five children, four of whom were unchanged at the time of report, while in the fifth case the condition had recovered completely in a week or so. These cases were all encountered during prevalence of epidemic poliomyelitis, and had developed after a few days of mild febrile illness.

In a number of instances paralysis of the external rectus muscle has coexisted with retraction movements of the eye upon contraction of one of the active muscles. These retraction movements occur upon attempting to turn the defective eye inward, and are sometimes combined with movement of the eye upward or downward. According to Türk, as quoted by Salus,<sup>14</sup> the more common form of retraction is that due to fixation of the globe on the temporal side, the external muscle in these cases being replaced by a rigid fibrous band, which contains few or no muscular elements. The actual existence of this condition is said to have been first demonstrated by Inouye.<sup>15</sup> In other instances the retraction is said to be due to an abnormal attachment of the internal rectus muscle, usually far back on the eyeball.

In a case reported by Griscom,<sup>17</sup> in which the left external rectus was paralyzed or absent, the left eye, when the patient attempted to look to the right, did not perform the normal movement of abduction, but turned sharply and directly upward, there being at the time a retraction movement of the eyeball and narrowing of the palpebral fissure. This peculiarity has been reviewed by Duane.<sup>18</sup> Two similar cases were reported by Tyson.<sup>19</sup> In one the left eye could not be carried beyond the median line, while upon abduction the left eye receded into the orbit, and the lids partially closed. In the second case the behavior of the eye was similar, there being in addition a slight tendency of the eye to turn upward.

Except in combination with defects of other facial muscles, I have not read of a case in which congenital paralysis of the abducens was bilateral. In the recorded cases, the eye on the affected side has commonly possessed good vision, at least with correction. In the case reported by Harris,<sup>20</sup> however, the left eye, the one affected, had been amblyopic as long as the patient could remember.

Experience as to the existence of binocular vision or diplopia in these patients seems to vary with individual observers. Thus Brown,<sup>21</sup> dealing with that class of cases in which paralysis of the exter-



nal rectus is associated with retraction movements of the eyeball, states that in the primary position binocular single vision is the rule, but that diplopia is present when the patient is called upon to look toward the affected side. In one of Tyson's<sup>19</sup> cases diplopia had been noticed for a year and a half. In a case reported by Sattler,<sup>22</sup> in which the patient had had a tenotomy of the internal rectus at the age of thirteen years, a double vision was stated to have been present throughout the life of the patient, who was then twenty-one years old. On the other hand, in my own two cases neither patient had ever been troubled with double vision.

As regards the treatment of congenital paralysis of the external rectus, a number of authors have discussed the advisability of substituting for the missing muscle portions of the superior and inferior recti. In a few cases such an operation has actually been performed with fairly satisfactory results. Thus, in the case reported by Harris,<sup>20</sup> that of a young woman of seventeen years in whose left eye the paralyzed muscle appeared as a flabby, pale, thin band, the temporal half of the tendon of each of the vertical muscles was severed from its attachment and split backward for at least a half inch, and then sutured with black silk to the site of insertion of the external rectus. A complete tenotomy of the internal rectus was also done by Harris at the same time. Practically full temporal rotation is said to have been obtained in the affected eye, although there developed a slight deviation of the eye upward and inward in the primary position.

A similar operation was performed by McDannald<sup>6</sup> in the case of absence of the inferior rectus which he reports; the superior rectus being tenotomized, and the external and internal recti being split and their lower portions reattached to the eyeball below. In the case of absence of the inferior rectus reported by Mitten-dorf,<sup>5</sup> the left eye was turned so completely upwards that a rather different operation was found necessary. After cutting the tendon of the superior rectus, the lower portion of both the external and internal recti was fastened by means

of a long suture to the lower orbital margin, by carrying the needle from the inner surface of the tendon under the conjunctiva and thru the periosteum of the orbital margin and piercing the skin so as to bring the suture out on the cheek, where it was tied to a second suture having a similar course.

It is doubtful whether in the majority of cases of congenital paralysis of the ocular muscles any appreciable benefit is to be expected from surgical intervention. This may be, as Verderame<sup>23</sup> remarks, because the defect of motility is not always striking, because the patient is not disturbed by diplopia, or because he has habituated himself to eliminate or at least to diminish the disturbance inherent in such affections. Moreover, adds Verderame, in some cases of this kind in which operation was performed, it was followed by the appearance of more or less marked disturbances, due to false projection or to diplopia.

CASE 1.—My first patient was a woman of twenty-three years, who had come for correction of squint. The history indicated that since birth the right eye had been incapable of outward rotation, altho always regarded as the better eye. This eye had 0.75 D. of hyperopic astigmatism, and the left eye 4.50 D. With correction each eye had vision of 5/7.5. The right eye could not be brought out beyond the median line, altho the movements were otherwise normal. There was distinct flattening of this eye at the normal site of insertion of the external rectus.

CASE 2.—The second patient was a boy of eleven years, whose left eye had turned in since birth, altho it fixed perfectly and had normal vision. The limitation of movement of this eye corresponded precisely to that of the right eye in the first patient, but there was no flattening of the globe. Neither patient, as already stated, had ever been troubled with diplopia. In the boy some cosmetic improvement was got from tenotomy of the left internus, and the possibility of transplantation of a part of the superior and inferior recti to the normal position of insertion of the externus was suggested as regards both patients, but the suggestion was not accepted by or for

either one. In discussing these two cases when they were presented a year or two ago before the Colorado Ophthalmological Society, Dr. Edward Jackson said that there had been no complaint of diplopia in any case he had seen, nor had he been able to develop diplopia in either of three personal cases.

#### DISCUSSION.

Harold Gifford, Omaha, Nebraska, had given some attention to the subject for the past thirty years, as it was about thirty years ago that he had seen the first case. He had personally seen twenty-nine cases of this condition. It was not more commonly reported, because people as a rule did not complain of the trouble. The deformity was very slight. These patients were not able to turn their eyes out, but this did not bother them because they were able to turn them in all right. If we watched all our patients carefully we should find more of these cases. The subject of etiology was what Dr. Gifford had been working on. He noticed that there were more girls than boys and more left than right eyes in which the condition showed. There were something like seventy-five percent of the cases in the left eye, and about sixty percent of

them were in girls. This made him suspect that this might be a birth injury. Hofnagel had reported some cases and had suggested that the condition was due to injury to the left side of the orbit as the head passed under the promontory. Gauss also proposed the same theory at some society meeting. The trouble with this theory was that in Dr. Gifford's cases he had only had one case in which there was any evidence of a birth injury. And yet there was almost the exact proportion between the number of cases of this muscular condition which were on the left side, and of cases of left occipito— anterior position. It was easy to see how a condition of this kind could be overlooked in the confusion at the baby's birth. Dr. Gifford had seen two bilateral cases. But one of these was complicated. In his first half-dozen cases he had not noticed the retraction which subsequently proved to exist in a number of cases. He had done an advancement with fairly good results in some cases.

As regards the occurrence in girls, that was not explained by the presentation at birth. But girls notice much more keenly any slight defect than do boys, and so also do their mothers. When boys have it it is nearly always in the right eye. Boys are likely to notice anything with the right eye more than girls.

#### BIBLIOGRAPHY.

1. Lennon, M. B. *California State Med. Jour.*, 1910, viii, 115.
2. Webber, F. P. *Boston Med. and Surg. Jour.*, 1910, cxliii, 721.
3. Cooper, H. *Brit. Med. Jour.*, 1910, I, 917.
4. Gebb, H., and Voss. *Berl. kl. Woch.* 1910, xlvii, 961.
5. Mittendorf, A. D. *Manhattan Eye, Ear, Throat Hosp. Rep.*, 1914, xv, 118.
6. McDannald. *Arch. of Ophth.*, 1914, xliii, 515.
7. Von Imre, J., Jr. *Zeit. f. Augenh.*, 1913, xxx, 556.
8. Möbius. *Münch. med. Woch.*, 1888, xxxv, 91.
9. Kuhn. Quoted by Lennon, *California State Med. Jour.*, 1910, viii, 116.
10. Schenkl, R. *Centrbl. für prakt. Augenheilk.*, Leipzig, 1881, vii, 335.
11. Coover. Discussion of Crisp's cases. *Annals of Ophth.*, 1914, xxiii, 587.
12. Heubner. Quoted by Lennon, *California State Medical Journal*, 1910, viii, 116.
13. Lundsgaard. *Ugeskrift f. Laeger.* No. 47, 1912.
14. Salus, R. *Arch. of Ophth.* 1913, xlii, 34.
15. Inouye. *Ophthalmol. Klinik.* 1900, p. 285.
16. Abromeit. *Monat. für Psychiat. und Neurol.*, 1909, xxv, 440.
17. Griscom, J. M. *Coll. Phys. Phila.*, 1915, xxxvii, 415.
18. Duane. *N. Y. Med. Jour.*, 1914, xcix, 409.
19. Tyson, H. H. *Arch. of Ophth.*, 1915, xlv, 197.
20. Harris, C. M. *Penn. Med. Jour.*, 1916, xix, 495.
21. Brown, S. H. *Ann. of Ophth.*, 1910, xix, 464.
22. Sattler, C. H. *Arch. f. Augenh.*, 1910, lxvii, 206.
23. Verderame, F. *Annali di Ottalm.*, xlv, 779.

# OPERATION FOR EXTRACTION OF LENSES FULLY DISLOCATED INTO THE VITREOUS.

HOWARD S. PAINE, M. D.

GLENS FALLS, N. Y.

This paper points out the discouraging statements with regard to operation on these cases in the current literature, and the need for improved methods. It describes the method its author has devised and gives the results obtained by it, illustrated by reports of cases.

The Paine operation for Dislocated Lenses is original in furnishing thorough illumination of the interior of the eye. As a result of this illumination, there are three advantages: First, The operator can see clearly the instruments and the hinged or floating lens, during the entire operation. Second, The operator is enabled to use delicate instruments with precision. Third, It permits the operation at once, upon making the diagnosis, when further damage to the eye may be prevented.

The removal of a subluxated lens, one hanging by a hinge so that it swings or floats up into the pupil after an incision has been made, is comparatively easy of accomplishment. But when the lens hangs deep in the eye by a hinge, and is situated so far down and back that it refuses to float into the pupil when the incision is completed, or if it is entirely loose (fully dislocated), and lost into the inky depths of the vitreous, the difficulties are increased to the heretofore realm of the "impossible." In these desperate cases what do the authorities advise us to do?

In my earlier article, I quoted from a score of our ablest writers and operators. Some advised closing and bandaging the eye; some advised reopening the eye later if the lens became visible again, while Fuchs<sup>15</sup> stated that "the extraction of a lens floating in the vitreous is impossible." None of the great writers and operators minimize the dangers of operating for lenses hinged and hanging low down or entirely lost and floating about in the depths of the vitreous. No less an authority than Lt. Col. Smith in a letter to me writes:

"To do this case" (lens hinged and hanging low down), "you require a first

class assistant and to be a first class operator by the intracapsular method.—The capsulotomy school, of which Prof. Fuchs is an exponent, are quite right to avoid such cases."

If we turn to the American Encyclopedia of Ophthalmology<sup>2</sup> we find, where lenses have been dislocated during an operation, the following advice: "The lens may be dislocated during an extraction, especially in cases of fluid vitreous. Should this occur, it is usually best to wait awhile, and if the lens does not reappear in the pupillary space, to close the eye and apply a dressing. It is said that the cataract will sooner or later reappear in the pupillary space and may then be extracted" by reopening the wound and trying again. Török and Grout<sup>3</sup> and others, advise this plan.

In the main text of Fuchs<sup>5</sup> we find, in speaking of hinged or subluxated lenses, the following: "In cases in which the removal of the lens is difficult or impossible, all we can do is to combat the inflammation or the increase in tension, by means of an iridectomy." Also in the main text of Ball,<sup>6</sup> is: "An old dislocation with fluid vitreous humor, offers little encouragement,—if it is situated in the vitreous chamber, attempts to remove it are not justifiable, unless its position can be changed," i. e., caused to move into the anterior chamber. Beard<sup>4</sup> says "if the cataract must be 'fished' for—the depths of the vitreous dragged as it were—then a delicate wire loop would be the safer instrument to employ."

The present article has not been written to criticize our great operators and writers, but to try to fully and clearly explain to those who want to know, what to do and how to do it, and have found no



help from the books. I believe if I, dependent on my own initiative, without skilled assistants, who had at that time only once removed a lens in its capsule, who had never seen Smith's intracapsular operation performed, could remove five dislocated lenses successfully, that the operation should be, and can be done by many others.

#### ILLUMINATION.

The first step in the Paine operation is complete illumination of the interior of the eye during the entire operation after the incision has been made. In all the textbooks except those that have abstracted my former article, not one advises or suggests illumination of the interior of the eye while removing a lost lens. *This point is vital.* That this great essential in the operation had heretofore been overlooked, and that writers and operators were groping in the dark and complicating the operation to the destruction of these eyes, is well illustrated by the following sample quotation: "On making our incision, if the lens does not present, it is inadvisable to attempt any manipulation for its removal, and there is little to be gained by attempting to extract an *invisible lens*." Gruening.<sup>7</sup>

How sadly illumination is needed in the great world clinics is evident from the testimony of Dr. Meding at Saratoga,<sup>8</sup> "Even where lenses have slipped into the vitreous during intracapsular operation, it is not easy and seldom safe, to follow them up. The speaker has seen the world's best operators at their wits' ends in the attempt. In Vienna, Berlin, Paris, London, Madras, Bombay, Amritsar and Tokio, he has watched, assisted and operated, and is yet far from being able to propose a method applicable to two consecutive cases. He always advises great caution and to the less experienced 'hands off'." The above advice should be heeded by all who attempt the extraction of lenses that are not in plain sight. This paper has been written to show how the interior of the eye can be illuminated, the lens made visible in any part of the globe, and extraction become a comparatively simple matter.

All that is required for the illumination of the interior of an aphakic eye is

a white, ground glass, frosted, electric light bulb with corkscrew filament, of about 20 candle power, attached to a handle convenient to hold when and where required, generally about two feet from the eye to be operated on. The light should not be bright enough to make the patient wince and fight it. A magnifier with a three-inch focus will illuminate an aphakic eye so that one can look into its depths with ease when the pupil is dilated, and especially after the incision has let the aqueous escape when the iris hangs down giving a pupil enlarged clear to the limbus. A broad eye shade worn by the operator is a help. After the incision has been made, the operator, by sitting back of the patient's head, can easily look down from above to the very bottom of the illuminated eye. I have usually worn spectacles stronger than for my daily use, to magnify at a shorter distance. Dr. Wendell Reber<sup>9</sup> recommended "as an operating glass, a sphere with a plus four degree prism, base in, which gives a very delightful field at eight to ten inches."

#### THE OPERATION.

The patient should be in a darkened room on an operating table. Cocain and adrenalin should be instilled. Dr. Reber advises when patients are operated on under local anesthetic, the giving "three hours before the operation, twenty grains of bromid and ten grains of chloral; two hours before the operation another dose exactly the same; one hour before the operation 1/6 grain of morphin and 1/150 of atropin."

I have made the incision giving a long conjunctival flap, and in one instance inserted a stitch as a precaution against gaping. Dr. Smith of India in a letter to me said, "If possible then do an iridectomy." Dr. Elmer Bissell, calling attention to the danger of hemorrhage after an iridectomy, suggested the advisability of removing the lens first. Dr. Edgar S. Thomson<sup>11</sup> in the Saratoga Meeting said that "in the course of healing, the vitreous retracts into the eyeball, dragging with it the iris, which is folded back on itself so that the prolapse of the iris into the wound is very unlikely to occur." If such is the case, it would

seem as though an iridectomy might be omitted; but I have performed an iridectomy in every case. It can be done after the lens is out, if there is fear of hemorrhage. When the free border of the iris hangs low down it can be reached by a blunt hook, or a very delicate Fuchs iris forceps, by passing one blade a little below the pupillary border.

All authors agree that lenses dislocated into the anterior chamber cause certain destruction of vision and should be extracted. As these lenses frequently fall through the pupil into the vitreous during an operation for their removal, I should advise always having in readiness the necessary means for the illumination of the interior and the instruments for extracting a lost lens. It is most unfortunate and embarrassing to be guided by Meller,<sup>17</sup> who says "any attempt to recover it is useless and results only in further injury to the eye" and then to have to quietly close an eye, leave the lens in the vitreous, and poultice one's wounded pride by thinking of what failures other operators have made.

Lenses in the vitreous are either hinged or entirely loose. These hinged (semi-luxated) lenses, for the purpose of this article I will divide into two classes. First, those that float into the pupil after the incision has been made, and those that do not. Of the first class I can do no better than to quote from a letter from Col. Smith to me, and his book,<sup>12</sup> which says, "my experience in extracting such lenses" (he refers to lenses 'couched' by the native rawals or doctors), "when they float up behind the pupil is extensive. \* \* \* \* Once the incision is made they float up tight against the pupil, \* \* \* \* they are then quite readily extracted."

The second variety of hinged lenses hang so low down that after the incision has been made, the forward movement of the contents of the globe does not sweep them into the pupil. It is for precisely this kind and those "lost" that the Paine method is best adapted. In the first case, with the incision completed, the interior illuminated, and the lens hanging low down in the vitreous by a hinge, the simplest procedure is to pass a Stevens traction hook to the lowest

border of the lens, lifting or drawing it into the pupil, then slipping a Smith spatula behind it and sliding it up and out on the spatula by traction on the hook if it holds, or gentle pressure on the outside of the cornea, if the hook pulls out. With such a delicate instrument passed with precision into the illuminated vitreous, the crystalline can be easily and gently lifted into the pupil with little if any more displacing effect than the original passage of the lens through the vitreous. We should bear in mind that the gravity of a lens is so near that of the vitreous that the lightest touch will lift it, also that in these cases if the lens has been loose any length of time the vitreous has become fluid.

How much this operation, with thorough illumination and precision in the use of delicate instruments, differs from the usual methods can best be shown by referring to the American Encyclopedia of Ophthalmology,<sup>13</sup> where the whole gamut of operations and methods is explained. One is told how to endeavor to get dislocated lenses into the anterior chamber by turning the patient on his face, fix the lenses with needles and keratomes, push them forward with bidents, etc.

Dr. Reber<sup>9</sup> advocated the Ziegler vectis, a loop with teeth, for removing lost lenses, as follows: "It is an easy matter to slip it back of the lens, and once you get any grip at all on the lens it is like the barb on the fish-hook; the lens can't get away." Yet he adds, "The other case occupied the best part of three-fourths of an hour and we finally turned the patient on his side, to rotate the lens in such a position that we could get at it—I almost had to stand on my head to finally engage the lens.—The final vision was about 5/60."

The resumé of the American Encyclopedia of Ophthalmology concludes with what the editor of this section tells us is best, as follows: "Knapp's method is probably the best procedure for totally luxated lenses, free in the vitreous. As a rule, pressure on the lower eyelid over the sclera, with counter pressure by means of the upper lid, will bring success in most cases, and without great loss of vitreous. \* \* \* Loss of vitreous



should be met by injecting into the eye (to fill up the globe), a sufficiency of normal salt solution." As Beard<sup>16</sup> has most graphically described the possibilities of this method I quote from him as follows, under the head of "The sinking of the cataract into the vitreous during extraction." "When met, the operator must be prompt to act or all is lost. I have seen one of the most skilled and tactful ophthalmic surgeons the world has ever produced, fail utterly to deliver such a recalcitrant lens, and have seen others, almost as proficient, reduce the globe to a hopeless wreck when confronted with the accident. One of them placed the left thumb behind the incision and the right beneath the cornea and then approximated them, expelling cataract, vitreous body and all." If the field is not obscured by a large amount of blood, a lens lost during extraction should be removed at once and with little difficulty. It would be an unpleasant complication to be sure, but under ordinary conditions should not be serious with a good light, traction hook and spatula. A fine Stevens traction hook used with illumination, produces no trauma, does not stir up the vitreous, absolutely controls the lens, and it is not only easy and safe to follow up lenses lost during intracapsular operations, but to me seems criminal not to do so. On the contrary any loop or spoon used in the dark would naturally have to push the lens against the interior wall of an eye to get a grip on it and necessarily churn up the vitreous, detach the retina, and do other damage while scraping its way out.

The speculum I have found most suitable, is that used at the Moorfield's Hospital, London, with a very long shank fitting close to the temple. With this the lids can be raised by an assistant without getting in the way and light. This speculum can be obtained of Meyrowitz of New York. It is known as Knapp's speculum, as Dr. Knapp brought the pattern to this country. I prefer the modification with a hinge in each branch. By having the lids raised gently by the branches after the incision is made, I have thus far escaped loss of vitreous. It is even more important to keep all pressure of the lids from the eyeball dur-

ing this operation than in the intracapsular extraction.

The only hook I found suitable was a Stevens traction hook which is made by Meyrowitz also, and comes in the Stevens set of instruments for operating on the external muscles of the eye. It has a delicate shaft with a hook perhaps one-sixteenth of an inch long, turning at about 45 degrees backward, and as fine as a needle. The ordinary Tyrrell hook is less suitable because the shank is so near in line with the point (so much like a button hook), that the point would be prevented from catching the lens easily.

#### OPERATE AT ONCE.

This final essential is of vital importance. All authorities agree that a lens once dislocated is to all intents and purposes, a foreign body, acts as an irritant, and causes trouble sooner or later. Smith<sup>14</sup> says that the length of useful day vision in eyes where the lenses have been "couched" most successfully, is four years; hence the brightest outlook for such cases is dark. Every minute that a dislocated lens remains in an eye it is tending toward a more serious condition. A pathologic eye is more difficult to operate upon and offers less encouragement for the future sight of the patient. We should avoid delay which brings in its train certain destruction. We owe it to our patients to save their sight. Some eyes do tolerate lenses floating in the vitreous a long time, but they are not the rule. Knowing this, shall we do nothing and see these eyes steadily traveling the *via mortis*?

I would call attention to, and thoughtful consideration of the second eye of Miss L. and both eyes of Mrs. C. H. T. (Cases 2, 4 and 5.) Kindly note the stage they had reached. It took some months to recover lost ground, but the removal of the cause produced a cure, radical and permanent; not a final destructive trauma.

#### CASE REPORTS

Case 1.—November 9, 1903, Miss Mary L., aet 51, came with the right lens lying down and hinged at its lower border. It had been dislocated for two weeks. I read the authorities to her, and had her consult a prominent oculist who



also followed the advice in the textbooks. We waited. The eye steadily degenerated, and on Feb. 8, 1904, (three months), all vision was gone, the eye was soft and I advised its removal. Could an unsuccessful operation have been worse?

Case 2.—June 10, 1909, the left lens of this same woman began to loosen at the top. As the eye was not troublesome I waited; but the patient noticed the eye was gradually failing. In a little over six months, Dec. 29, 1909, the poor woman arrived at my sanitarium from another town at 7:30 P. M. The pain was intense, nausea persistent, vomiting frequent, patient was under opiates and had walked the floor the night previous. The lens was tipped far back and low down; the globe was as hard as a baseball and she could make out only hazy yellowish outlines. Realizing my inexperience, I had recommended this patient to several operators of wide reputation. She did consult some, but they gave her no encouragement, but when fulminating glaucoma attacked the eye, further delay was out of the question. It was night, a light had to be improvised at once, and this case gave the first point and basis to the Paine operation. I had thought about, and studied this case, but illuminating the interior of an eye while operating had never occurred to me until compelled by that emergency. Four months after operating she had 1/10 vision. In ten months the eye had 1/2 vision, and in one year and a half after operating, the degenerative changes had so recovered and the eye became so normal, that this eye read half the letters on the twenty-twentieth line and diamond type nearby with ease. This eye continued to gain for another year until the patient died.

Case 3.—Walter O. C., aet 25, came Oct. 23, 1916, with a congenital cataract that had recently dislocated forward thru the pupil into the anterior chamber. For the sake of good illumination and to be in readiness should the small undeveloped lens slip into the vitreous, the operation was performed in the evening and the same simple lighting arrangement was used. This case was entirely successful tho the neighbor who held the light and the patient's doctor, who

held the speculum, had never assisted at an eye operation before.

Case 4.—Mrs. C. H. T., sister of Miss L (above), came July 13, 1914. I found the right lens dislocated so far down and back and hinged, that it was impossible to see it without looking from above downward almost in line with the forehead. The patient had suffered from mild attacks of increased tension, that readily yielded to eserine, for seven years, but had changed her glasses from a weak plus to a minus 5.50 combined with a cylinder, and these gave vision of less than 20/30. This lens never showed in the pupil. It finally broke loose entirely and floated about in the vitreous.

Case 5.—The same person as Case 4. February 9, 1915. The lens of the left eye began to luxate. This made four dislocated lenses in the eyes of two sisters. The dislocations occurred between the ages of 51 and 57. In Dec. the right eye "commenced to fail." Black specks were in evidence in increasing numbers and density; bright flashes appeared frequently, the light causing lacrimation. It was the beginning of the end. I had delayed operating because I had no guide except my own experience and did not want to possibly destroy what vision there was by attempting the "impossible." After operating, I could not see, nor can I now, why any good operator should not repeat my operation successfully. Both eyes were operated on, the right Feb. 21, 1915, and the left May 6. Lacrimation slowly improved, both eyes grew stronger, the light could be borne better, until Aug. 24, 1915, when both eyes were fitted to glasses, six months after the operation on the right, and four months the left. Either eye reads twenty-twentieths and the finest type either singly or together. On March 1st, 1918, three years after operation, this patient read for me, standard type both near and far, with each eye and both together, and said that her eyes are now more normal and comfortable than they have been for ten years. She threads and uses a No. 7 needle with ease. This is the case presented and examined at Rochester and Saratoga.

Case 6.—Mr. G. C., aet 60. Traumatic dislocation of right lens which

was hinged at its outer lower quadrant, and hung out and down. May 11, 1915, removed this dislocated lens. After the incision it moved forward somewhat, as an illy defined, hazy mass, situated deep in the vitreous. The eye was illuminated. A Smith spatula was placed behind the lens and it was removed with ease. This eye healed uneventfully. The eye was clear. The patient is illiterate and does not care to use it as the left eye is normal. There is a small detachment of the retina in this eye located directly under where the cataract rested, whether the result of the trauma or associated with the operation I do not know. It could not be seen until the lens was removed.

The above six cases are all I have had to deal with in recent years. One was left to itself and became sightless in three months. Five were operated on and the results were perfect. In no eye has degeneration occurred after the operation, but every one has improved. These were not cases "for which little skill and less thought suffice," Meding,<sup>8</sup>

nor were they "eyes that would withstand every possible manipulation," id. because we all know that inherent weakness exists in eyes where lenses luxate spontaneously. They were all sick eyes except Case 6. (Traumatic.)

A friend of mine, an eye surgeon on the staff of one of the largest eye hospitals in New York City, told me that in 34 years of hospital experience he could not recall that he had any more cases of dislocated lenses than I had had. Now, if that is so, my experience should not be a "happening." Five such cases in series have more than good luck or accident associated with them. They should form a "basis for general and safe advice," Meding,<sup>8</sup> and by clearing up this dreaded subject, they are not "dangerous as precedents inseparable from the experience in which they occur." id. The number of these cases is small. But should they be neglected, or is that any excuse for remaining ignorant of a successful method to relieve them?

#### BIBLIOGRAPHY

1. Paine. *Ann. of Ophthalmology*, v. 24, p. 496.
2. *American Encyclopedia of Ophthalmology*, v. 1, p. 184.
3. Török and Grout. *Surgery of the Eye*, p. 266.
4. Beard. *Ophthalmic Surgery*, 2nd ed. p. 529.
5. Fuchs. *Text-book of Ophthalmology*, 1917 ed., p. 558.
6. Ball. *Modern Ophthalmology*, p. 470.
7. Gruening, Norris and Oliver's *System of Diseases of the Eye*, v. 3, p. 691.
8. Meding. *New York State Journal of Medicine*, April, 1917.
9. Reber. *New York State Journal of Medicine*, April, 1917.
10. Bissell. *Tr. New York State Homeop. Medical Society*, 1916.
11. Thompson, *New York State Journal of Medicine*, April, 1917.
12. Smith. *The treatment of Cataract*, p. 22.
13. *American Encyclopedia of Ophthalmology*, v. 10, p. 7206-7211.
14. Smith. *The treatment of Cataract*, p. 23.
15. Fuchs. *Textbook of Ophthalmology*, 3rd edition, p. 464.
16. Beard. *Ophthalmic Surgery*, 2nd ed., p. 528.
17. Meller. *Ophthalmic Surgery*, 2d ed., p. 169.

# A THEORY AS TO THE ETIOLOGY OF GLAUCOMA.

ROBERT SCOTT LAMB, M. D., F. A. C. S.

WASHINGTON, D. C.

This paper traces an apparent connection between disturbance of balance among the internal secretions and glaucoma, and points out the therapeutic application for such a conception of the disease. Read before the American Academy of Ophthalmology and Otolaryngology, October, 1917.

In a paper read before the American Academy of Ophthalmology and Otolaryngology in Memphis, Tenn., December, 1916, I made the statement that, "The more chronic inflammations may usually arise in conjunction with vagatonia, but such a condition as simple glaucoma is probably the end result of of gonadal and adrenal insufficiency. Whereas acute inflammatory glaucoma is probably the result of a sudden imperative demand upon the adrenals for secretion to sustain itself against shock, fear, etc., in the presence of gonadal and adrenal insufficiency; for although the secretion is forthcoming for a short period, the inability to continue to supply it causes a precipitate lowering of sympathetic tone and throws the balance under the control of the vagus. This, of course, in the presence of predisposing factors, such as high hyperopic eyeballs and other anatomic abnormalities." In continuation of that thought and in order to substantiate it I have thought best to record some few, if not all, of the reasons which led me to make this statement.

I have taken this opportunity to come before you with a subject which is of vital interest to us all and of serious moment to our patients; in the hope that your discussion may corroborate my findings, or that differences of opinion or experience may be brought out which will be of benefit to us all.

The first thing that I should like to bring to your attention is the fact that the majority of patients having acute inflammatory glaucoma are "getting along in years"—somewhat beyond the period of life when the "change" occurs—that is to say 45 years of age—and also that it is in the habit of occurring in nervous or neuropathic patients

belonging to families with neuropathic tendencies. As is well known many of these patients have lived on rich food and have been addicted to stimulants, and their lives have been full of excitement.

The history of the average case contains evidence of a definite shock occurring at an early age, to disturb the internal secretory balance; in these cases frequently there is chorea. Then about the time of puberty there is apt to be a history of a nervous upset and frequently a breakdown and the withdrawal of the child from school. During the adolescent emotional period there have been nervous disturbances associated somewhat with headache; and as this period passes into that period of life wherein the burdens of life are taken up with more serious intent and purpose, there is apt to be the beginning of headache of a unilateral character, frequently associated with scintillating scotoma. Of course, in no single case do all these symptoms necessarily occur and we need not expect to find them all. And so, thru the easily disintegrated subsoil structure of such an individual, filters the effect of repeated shocks, until the system is well-nigh exhausted. Furthermore, there seems no end to the multiplicity of intercurrent etiologic factors of an indirect character which help to tear down the barriers thrown up by the defense mechanism of the body.

Thruout the prodromal period there are recurrent attacks of intra-ocular tension often accompanied by unilateral headache. These are frequently treated by the family physician, and as the significance of such recurrent headaches of this character has not been definitely brought to his atten-



tion, these headaches receive no ophthalmologic consideration. Again, the ophthalmologist seeing such a case may not have realized the possible consequence of repeated attacks of this character; and so may correct the patient's refractive error with glasses, which for the most part relieve the headache, and nothing further is done until an acute attack comes on.

It is impossible in the limited time that we have to go into the analysis of the contributing etiologic factors; and as I do not propose to consider the treatment or management of glaucoma it seems only fair to presume that we are all familiar with the commonly accepted predisposing elements making up the fabric of the substructure upon which the glaucoma may supervene; such as anatomic structural predispositions; age, arteriosclerotic changes, chronic gastro-intestinal diseases, long standing genito-urinary troubles and so-called "Rigg's Disease;" occurring in an individual with a rather well-known nervous temperament.

We all know the picture of an acute inflammatory glaucoma with its early intense bright red congestion, accompanied by general swelling and a tendency to dilated pupil, shallow anterior chamber, clouding of vision and an excruciating pain, precipitately following a shock to the nervous system—usually thru emotional pathways. The picture later changes to one of deep congestion, with a steamy cornea, turgid conjunctiva, subconjunctival and orbital tissues, frequently associated with vomiting. This picture, of course, is quite different from the condition we have known as simple or chronic glaucoma; and yet I am not so sure the underlying factors of the latter are very different. They are probably simply acting with less intensity over a longer period of time.

Holding this picture up to the light of analysis by reason; it is only fair that we ask ourselves, first, what produces an acute congestion? Our answer must of necessity be, activity of the sympathetic nervous system of the sympathico-tonic type, stimulating the vasoconstrictors, which tends to in-

crease the arterial flow. Next we say to ourselves, what activates the sympathetic, of the sympathico-tonic type? And we find the suprarenal glands, or that adrenalin so activates the sympathetic nervous system, and that the thyroid sensitizes the end plates of Langley on which the adrenalin works. And again, what causes the passive congestion when the venous trunks are engorged? We realize that the vasomotor dilators following stimulation to the vagus nerve cause passive or venous congestion. A lack, therefore, of suprarenalin secretion or thyroid active principle would give the pituitary a chance to bring about a control by the vagus. The gonads being closely associated with suprarenalin, both by embryologic origin and physiologic relationship, are called upon in the presence of suprarenalin activity to assist in the defense processes of the body. If, therefore, they are called upon in acute glaucoma to add a sustaining quality to the defense, and are found wanting, what is more natural than that the vagus nerve should take charge, thereby producing a venous congestion and causing the marked turgescence which is so commonly seen in the later stages of an acute inflammatory glaucoma.

If the hypothesis is correct what then would be the best method of medically controlling such a condition? By administering those drugs which would tone up the sympathetic system and so improve the circulation, at the same time causing all over the body a relaxation of the smaller veins. We then ask ourselves what drugs can do this, and we find that adrenalin chlorid will tone up the sympathetic system, and pilocarpin, acting thru the vagus, will give us sufficient relaxation to permit the re-establishment of the circulation, more normal tone and a gradual restoration of the local structures to size and condition approaching that which immediately preceded the acute attack.

This has been tried out now in thirteen cases and has been successful in each case, in restoring the eye to a relatively normal condition, so that the

dangers from a subsequent operation to increase the drainage, were undoubtedly very much lessened; and as the visual results were better than in other cases operated on previously, during an acute attack, it was deduced that perhaps the method of controlling the condition first and operating later, when relations of the structures had become approximately normal, had some advantages over any operation done under adverse circumstances at the time of the acute attack.

I merely make the statement of the results of applying this theory to indicate that in all likelihood the theory has its merits. Tho, of course, a few cases do not entirely prove the theory, it is certainly a basis from which we may approach cases occurring in our

practices in the future. So far as I can see my previous statement regarding simple and acute glaucoma, that they are similar in character, except for the intensity of the vasomotor changes, being less intense in simple glaucoma and almost violent and cyclonic in acute glaucoma, is probably true.

I have offered this theory of the etiology of glaucoma to stimulate discussion of the subject and do not claim for a moment that I have proven that it is correct. It is offered further as a suggestion for assistance to those who are seeking some better way of obtaining more satisfactory end results than those they have been able to obtain by methods previously suggested and in relatively general use for the management of this affection.

## A STUDY OF THE EYE IN DEMENTIA PRECOX.

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Reviews the literature of its subject and records the results of the author's observation on 53 cases of dementia precox with his conclusions, which in the main agree with those of previous writers. Read before the American Academy of Ophthalmology and Oto-Laryngology, Oct. 30, 1917.

Inasmuch as the majority of oculists see comparatively few cases of dementia precox, it might readily be concluded that a discussion of the eye in relation to dementia precox is, to all intents and purposes, academic. But if we believe all we are told by later day investigators, this disease is and must continue to be on the increase particularly if it is to be explained on a luetic basis. If, therefore, oculists can point out certain definite changes in the eye as pathognomonic of early stages of the disease, and our knowledge of the causative factors becomes equally sure, the importance of the investigation of the eye in suspected mental deterioration takes on a new aspect.

At the time I took up my investigation, I did not realize that the field had been covered as well as it has. In Europe, the subject has been taken up by Kuhnt,<sup>1</sup> Blin,<sup>2</sup> Meyer,<sup>3</sup> Reichman,<sup>4</sup>

Bumke,<sup>5</sup> Murchie,<sup>6</sup> of Glasgow, and others; while in this country, Posey and Spiller,<sup>7</sup> Tyson<sup>8</sup> of New York, Thomas<sup>10</sup> of Oakland, California, and Cooke<sup>10</sup> of Seattle, have made considerable investigations in this field. They largely directed their attention toward the formulation of a syndrome of the eye in dementia precox.

Spiller and Posey, in their work on "The Eye in Nervous Diseases," conclude that there are no ocular phenomena of importance, no pupillary changes peculiar to any mental disease; and go on to state that where actual and persistent pupillary changes are found to exist, we can assume the presence of grave or organic disease. After discussing the investigations of other workers of the various pupillary reflexes and other phenomena, they conclude: "That in dementia precox definite changes in the pupillary reactions are not found,

save first, such as can be attributed to defective innervation, i. e., the dilatation of the pupil; and, second, such changes or deficiencies of action as depend on diminished psychic activity."

In 1908, Tyson wrote an article on "The Ocular Disk Changes in Dementia Precox," and another in 1912 on "The Eye Syndrome in Dementia Precox," working in collaboration with Clark. His data, description and conclusions are clear-cut and forcibly presented, but have not been confirmed by other observers, except in part. He lays great stress on the disc changes, basing his conclusions on a carefully studied group of 115 cases of dementia precox. Accompanying the article are three admirable water colors, illustrating the different phases of a low grade optic neuritis or perineuritis. The first shows congestion of disc, hyperemia and edema: dilated, dark-colored veins, with contracted arteries, and blurring of the edges of the disc. The second shows congestion of the nasal side, with temporal pallor of discs while the third shows pallor of discs with dilated veins and contracted arteries. He claims these different pictures are found practically only in dementia precox.

He also examined the pupillary changes in 85 cases. Here his observations were just as positive as they were in those of the fundus changes. There was a constant enlargement in the size of the pupil; the sensory reflex was absent in 79 instances, and the psychic reflex in 85.

The visual color fields were examined in 81 cases. All were concentrically contracted from 30° down to nothing, the average field being 10.6°. He admits, however, that there was cause for error in the taking of fields, due to the lack of cooperation, in numerous instances, on the part of the patient; and the results of these examinations were included in his averages, which makes his conclusions in regard to the fields somewhat unreliable. In summing up, he says: "The changes in the discs, pupils, visual fields (and corneal sensibility), when taken together, constitute the new syndrome and are

all in accord with each other. In our examination of all other types of insanity, imbecility or idiocy, we have found no other condition similar to what we have outlined here for dementia precox. The \* \* \* \* findings indicate that dementia precox is attended by such an early and constant syndrome of alteration of disc, visual field, pupil and corneal sensibility as to materially aid in diagnosing this psychosis."

Tyson's investigations would seem to have settled the matter of pathognomonic syndrome of dementia precox, but Thomas, of Oakland, California, while confirming his investigations in part, seems to have found practically the same disk and fundus changes in a number of forms of insanity. In an article published in the American Journal of Insanity in 1914, entitled, "Optic Neuritis and the Color Fields in the Diagnosis of Syphilis, Neurasthenia, Hyperthyroidism, Dementia Precox, Maniac Depressive Insanity and Third-Generation Insanity," Thomas, as he expresses it, takes a bold plunge. He argues that our preconceived ideas of the appearance of the normal disc are wrong; that minor and lesser degrees of optic neuritis are entirely overlooked and classed as normal. After describing his conception of the appearance of a normal disc, he pictures and illustrates seven stages of disc changes, ranging from the normal to a well developed papillitis. He lays great stress on the presence or absence of the porus opticus, or physiologic cupping, saying, "I believe that every disc without a porus opticus or with a faintly marked one is abnormal, and should be so considered." The stages referred to above illustrate the natural cupping, gradual filling of cup, no cup (causing a flat appearance of disc), slight elevation, distinct swelling, and finally disappearance of the sharp outline of the disc, merging into the fundus.

Thomas examined a great many cases of different forms of insanity, and claims to have found the low-grade optic neuritis in all forms of them. He speaks of Tyson's work; and while confirming to some extent his observations



he does not admit that they are peculiar to dementia precox. He explains these changes noted almost entirely on a luetic basis. He gives illustrations of color fields. They show a contraction, most of them sector like with interlacing color fields, and were the result of examination of 17 cases, including three acquired syphilis, acquired tuberculosis, ocular neurasthenia, exophthalmic goiter, maniac depressive insanity, hypophyseal disease, angioneurotic edema, and neurasthenia. The original diagnosis was made from the above eye findings, and the etiology given as syphilis. The conclusion to be derived from the article of Thomas is that in dementia precox, as well as in other forms of insanity, we have a syphilitic infection, acquired or hereditary, producing an optic neuritis of low grade, which is frequently overlooked; that this optic neuritis, shown by one of the various stages of optic disc change, with the sector like contraction of the color fields, means luetic infection in the great majority of instances.

Dr. F. Murchie, in 1913, writing in the Glasgow Medical Journal, concludes that no reliance can be placed on the subjective symptoms, owing to the mental state of the patients with dementia precox. He finds corneal sensibility diminished, light reaction present, but slow; while the psychic and sensory reflexes were normal in 18 per cent, sluggish in 20 per cent and absent in 62 per cent of dementia precox. The fundus changes observed were venous swelling with tortuosity in some cases, arteries contracted, pallor of disc, congestion of disc and sometimes a mixture of the two; that is, nasal half congested and temporal half pale, which confirms certain of Tyson's descriptions; in other words, he finds a papillitis, which appears in other conditions also, of the same type as in dementia precox. He goes on to state that a differential diagnosis cannot be made on eye findings alone, but changes in pupils and fundi with vague and mental symptoms might assist in diagnosis.

Cooke, of Seattle, writing in "Ophthalmology," confirms in general

Thomas' findings. He examined four groups, and his conclusions are more clear cut and distinct than those of Thomas. He found, in 24 cases of general paresis, 28 cases of dementia precox, and 12 cases of maniac depressive, the same filling in of the porus opticus in all stages, with pallor of papillomacular bundle, indistinctness of disc margins and vascular abnormalities in all three groups, which rather conclusively contradicts Tyson's statement that these changes are peculiar to dementia precox alone. Like Thomas, he believes that these cases are practically all syphilitic. He examined the discs of seventeen normal persons, and found some of the above conditions present in four of them; which leads us still farther away from the idea of a syndrome in dementia precox.

Professor Bumké, in an able article written on the pupillary disturbances in dementia precox, gives us the nearest approach to a syndrome which I have found. He describes, first, a lack of the psycho-reflexes; second, the lack of the normal restlessness of the pupil; and third, the absence of reflex mydriasis in response to sensory stimuli in the presence of maintained light. In regard to the absence of the normal restlessness of the pupil, he goes on to state that the pupil of a normal person is in a constant state of motion. The loss of this "springiness" of the pupil, as it might be designated, is invariably indicative of dementia precox. He says that the reason that this has not been observed by investigators in general is that it cannot be determined with the naked eye; he, himself, having used a suitable magnifier in his investigations. His observations, as above noted, were confirmed by Heubner in a large majority of 236 patients. Siglos also found a lack of "springiness" of the pupils and the loss of the sensory reaction in 12 out of 13 hebephrenics, 16 of 17 catatonics, and 9 of 10 paranoid dementias. Bumké also goes on to say that the pupils are constantly larger than normal.

My own observations include an examination of 53 cases of dementia precox and 13 cases of maniac depressive

insanity. The changes in the disc noted in dementia precox did not confirm Tyson's observations except in part. I did not find one instance of disc alteration as shown in the third illustration of his article. The changes were more as those described in Thomas's article. The most constant feature of the change in retinal appearance was the dilated and sometimes tortuous condition of the veins, together with the contracted arteries. The disc at times was of a normal appearance, while at others it would range from a hyperemic condition to a quite well-marked papillitis, and occasionally would show a condition described by both Tyson and Thomas—that is, the inner side congested, and the temporal side pale. I found the cupping normal in 40 per cent, diminished in 45 per cent and filled in 15 per cent.

I attempted to examine the fields; but, naturally, this was impossible, except in a limited number of instances. I did take, however, the form and color fields in 15 selected cases of dementia precox in the more recent stages of the disease. Wherever there appeared to be any discrepancy in their answers, I took the fields a number of times, and did not record results unless they were repeatedly corroborated. The charts show, in the majority of instances, the concentrically contracted field for form and color, with frequent interlacing of the color fields. The contraction ranges from slightly less than normal to 30 degrees, which is practically the same result shown in the investigation of the others mentioned. The maniac depressives showed the cup filled, with deep congestion, in 35 per cent and partially filled in the remainder, even to slight elevation.

In the examination of the pupils, my efforts were directed towards a group of phenomena as described by Bumké; and, my results largely confirmed his observations. I found, in 65 per cent, a lack of the "springy pupil" which he described; while the sensory reflex was absent in 70 per cent. In observing these phenomena, I used a convex lens of 13 diopters, as I found, as suggested by him, that it was impossible always

to accurately see the movement of the iris where its activity was lowered but not absent. I also found that this lack of "springiness" in the pupil, as well as the lack of sensory reflex, was practically always absent in the same case. (Bumké and Weiler never missed these pupillary reactions in sane people—Heubner, in 3 only.) The pupil was a little larger than normal in practically all cases.

Of the 13 cases of maniac depressive, I found the lack of springy pupils and absence of the sensory reflex in 30 per cent. It is possible that the reason my percentage in recording these phenomena of dementia precox are lower than those recorded by Bumké and others quoted by him is because most of the cases which I examined were of fairly recent origin, and it is possible that in later stages of the disease the percentage of these changes referred to would be higher.

An interesting contribution to this subject is given by Bayard Holmes,<sup>12</sup> of Chicago, in a *Lancet-Clinic* editorial, July 24, 1915. He goes on to state that it has been demonstrated in a large number of cases experimented on that a solution of adrenalin, 1:1000, placed in the normal eye, did not cause mydriasis at the end of thirty minutes. He further gives the results of some observations of J. H. Schultz, and also of Richard Cords, of Bonn, in which they found, in cases of indubitable dementia precox, adrenalin mydriasis came on at the end of ten minutes.

In conclusion, the majority of observers so far, myself included, do not find disc and fundus changes that are pathognomic of dementia precox. I believe that the researches of Bumké point more clearly to the possibility of an eye syndrome in this disease; i. e., the absence of psychic and sensory reflexes, the natural "springiness" of the pupil and the enlargement of the pupil. The classification of the different forms of insanity is not always easy, and it is possible that the discrepancy noted between the results of different observers may be due to the fact that our present classification of dementia

precox is not quite as it should be. If future investigators will follow up the suggestion of Bumké in regard to pupillary phenomena, and also the hint given us by Dr. Holmes, it may lead to something definite in the formulation of an eye syndrome in dementia precox.

## BIBLIOGRAPHY.

1. Kuhnt. *Zeit. f. Augenh.*, 1903, p. 89.
2. Blin. Monograph, 241 pp. J. B. Baillière, Paris, France, 1905.
3. Meyer, *Neurol. Centralbl.* Leipsic, 1890, p. 610.
4. Reichmann. *Arch. f. Psychiat. u. Nervenkrank.*, v. 53, p. 302.
5. Bumke, Jena Thesis, 1911.
6. Murchie. *Glasgow Med. Jour.*, 1913, v. 80, p. 133.
7. Posey and Spiller. "The Eye and Nervous System," p. 508.
8. Tyson, H. *Boston Med. and Surg. Jour.* Jan 30, 1908.
9. Tyson and Clark, L. P. *Arch. of Ophth.*, v. 41, p. 223.
10. Thomas, H. G. *Amer. Jour. Insanity*, 1914, v. 62, No. 1.
11. Cooke. *Ophthalmology*, v. 13, p. 34.
12. Holmes. *Lancet-Clinic.* July 24, 1915.

## ARTIFICIAL DAYLIGHT ILLUMINATION FOR PERIMETRIC STUDY AND GENERAL OFFICE USE.

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The methods of making artificial light to imitate daylight are mentioned, and the superior comfort of such illumination and its usefulness in giving normal color values are referred to. The advantage for perimetric tests is largely in the constancy of such illumination and its availability at all times. Read before the American Academy of Ophthalmology and Oto-Laryngology, Oct. 30, 1917.

The need of artificial daylight illumination has long been felt, not only for the purpose of lighting up test cards and to obtain uniform results in perimetric work and color studies, but in many instances in order to obtain satisfactory and comfortable lighting for the average professional office in large cities.

When a good northern exposure with adequate window facilities can be obtained, the problem of office illumination is easily and satisfactorily solved. This, however, is the exception, rather than the rule, and even with these conditions fulfilled, there still remain the proposition as to how to obtain uniform results in perimetric work under variable weather conditions and the question of the test card illumination.

Much study has been given to the reproduction of daylight during the past ten years, and Dr. Herbert E. Ives, of the Photometrical Laboratory

of the United Gas Improvement Company of Philadelphia, and Dr. Henry Phelps Gage of the Corning Glass Works, of Corning, N. Y., have contributed largely to the perfecting of methods to accomplish this end. It is needless for our purposes to enter into a discussion of the intricacies of the problems encountered, in evolving the practical and satisfactory devices which are now offered to us. It is pertinent, however, to analyze our peculiar needs and the substitutes for daylight which are most suitable for our purposes.

For office illumination efficient artificial light is not always either satisfactory or comfortable. When simply the question of illumination enters into the problem, one of the ordinary forms of electric lights or the Welsbach burner, when properly safeguarded so as to remove direct glare, may suffice. This form of illumination, however,



will rarely furnish the comfort to the eyes equal to that which is produced by the yellow of the sun's rays, blended with the blue of the sky and filtered thru a rather homogenous atmosphere. Most of these artificial lights, when subjected to spectrum analysis, will show an excess of red, green and yellow. The problem, therefore, which confronts the chemist is the blending of a glass filter so as to reduce or absorb the excess colors, in order to produce a spectrum analysis which is similar to that of daylight. This is a scientific problem which we as physicians must relinquish to the physicist and to photometric laboratories.

What are our particular needs? For perimetric and color studies uniformity and constancy are important factors. Daylight will vary at different times of the day and from day to day under changing atmospheric conditions. If, therefore, we can obtain artificial illumination which approximates the spectrum analysis of sun light, there can be no objection to its use. On the contrary, if such a light can furnish uniformity and constancy in saturation of colors, it must commend itself to us.

In the industrial world artificial illumination is employed daily in the careful analysis and color matching of dye houses and textile mills, and if satisfactory to so crucial a test, it should be suitable for our professional purposes. The distinct advantage to be gained is to be able to examine patients at any time, under uniform conditions and under conditions which can be obtained in any office.

In the selection of a suitable light, one factor at least must be considered, namely, the cost of installation and maintenance. According to Gage (*Journal of Franklin Institute*, May, 1914), an incandescent black body at 5000 C. should furnish a spectrum distribution of the intensity of daylight, but, "such a temperature," he says, "is beyond the present means." The passing of electric currents through a rarefied gas—(a carbon dioxide vacuum tube, sold in the market under the trade name of the Moore tube) has been extensively practiced commercially and

with considerable success. The cost of installation and maintenance, however, is prohibitive. An absorbing screen, from the standpoint of economy and efficiency, has therefore proven to be the most practical method of obtaining artificial daylight.

Some months ago, thru the courtesy of a local firm in Philadelphia, the Corning "Daylite" screen was placed on my desk for experimental study. The light emitted was so free from glare and so much in its general effect like natural daylight, that I was prompted to investigate its qualities. In common with all forms of screens devised for a similar purpose, the light furnishes only 15 per cent of efficiency, the balance being absorbed by the filter so constructed as to reduce the blue, red and yellow to normal daylight values. This, however, is the only objection.

The Corning Glass Works, who manufacture it according to the method evolved by Dr. Henry P. Gage, claim that in its spectrum analysis it approximates normal daylight. This claim has been verified by other physicists.

For my perimetric studies, I have had in use a 75 watt Mazda lamp, covered by the "daylite" screen and protected by a deep reflector so as to prevent the direct glare. It furnishes an evenly distributed illumination to the campimetric surface; which gives one the sensation of good daylight exposure, and is the most satisfactory form of artificial illumination which I have thus far employed. The illumination of the test card is softer and whiter than by Mazda lamps covered with frosted glass. For desk use the light is ideal.

I have no desire to appear in the role of an advertising agent for the output of any commercial house. But as we are dependent upon the product of some photometric laboratory, and as all daylight screens are manufactured by the Corning Glass Works, I do not hesitate to recommend to the profession this "daylite" lamp or screen, as being admirably adapted to our special needs. Furthermore, with uniformity

of illumination obtained at a nominal cost, there can be no objection to concerted effort on the part of the profession to do their perimetric work under the best possible conditions, with at least an attempt at standardization of methods. From a scientific standpoint, there can be no objection to an artificial illumination which will stand the test of spectrum analysis.

We have much to learn in qualitative and quantitative perimetry. Quantitative studies have been fairly well worked out by the means at hand, and our knowledge has a fair degree of accuracy even without an attempt at standardization of methods and of illumination. Qualitative studies, however,

which after all, are the studies of real value, have not been developed to the same extent. Standard illumination has been lacking. Color thresholds have been studied under all degrees of illumination, notwithstanding the fact that there is a vast difference between studies of the light-adapted eye and the scotopic or dark-adapted eye. Examinations made in a subdued light, or in so called twilight, will not yield the results of maximum photopic vision. Standard illumination, therefore, which can be controlled, will not only aid materially in obtaining uniform results, but will help to develop valuable scientific information in qualitative perimetry.

### SHORT ABSTRACTS.

Under this heading only points of the greatest importance will be noticed. For the systematic review of the literature see "Digest of the Literature," a part of which appears each month.

**Holmes, G., and Lister, W. T. Disturbances of Vision from Cerebral Lesions with Special Reference to the Cortical Representation of the Macula.** (Brain, Vol. 39, 1916, pp. 34-73.)

In opening these authors say, "Owing to the conditions under which we have worked, most of our observations were necessarily made at a relatively early date after the infliction of the wound." The fact is recognized that it makes possible the objection that the cases were mainly examined during the stage in which the effects of shock or diasthesis were still present.

They also say: "The visual defects we describe may have been due to functional disturbances rather than to localized injuries of the corresponding cortical areas or of their centripetal fibers; but if we can show that there is a constant relation between the probable site of the injury and the form of the visual defect, it is obvious that certain general conclusions will at least be justifiable." These are presented with the statement that they can not be regarded as final as follows:

1. The upper half of each retina is represented in the dorsal, and the lower in the ventral part of each visual area.

2. The center for macular or central vision lies in the posterior extremities of the visual areas, probably on the margins and the lateral surfaces of the occipital poles.

3. That portion of each upper quadrant of the retina in the immediate neighborhood of, and including the adjacent part of the fovea centralis is represented in the upper and posterior part of the visual area in the hemisphere of the same side and vice versa.

4. The center for vision subserved by the periphery of the retinae is probably situated in the anterior end of the visual area, and the serial concentric zones of the retina from the macula to the periphery are probably represented in this order from behind forwards in the visual area.

GEORGE A. MOLEEN.

**Marie, P., and Chatelin, C.—Visual Disturbances due to Lesions of the Intracerebral Optic Pathways and of the**

**Cortical Visual Sphere as the Result of Gun Shot Wounds of the Head.** (Revue Neurolog., Vol. 28, 1914 and 1915, pp. 882-925.)

These authors review extensively their experiences with this subject, paying particular attention to the calcarine region of the occipital cortex with relation to segmentation of the visual fields and the corresponding lesions responsible for them, as well as macular vision and central and pericentral scotomata.

It was found that the great majority of the wounded coming under their observation, including those cases of cortical blindness, inferior hemianopsia, quadrantic hemianopsia, hemianopic scotomata of all forms, single and multiple, all demanded methodical research by means of a perimeter, because these lesions were very often ignored both by the injured and the physician. The estimation of the visual field was taken with great care by means of a perimeter, and always by daylight—the patient having his back toward a window, in a black walled room. Three discs were employed for measuring purposes, respectively, one, five and ten millimeters in diameter. The first being used to measure the limits of the purely macular scotomata. The margins of the color fields have been measured in the same manner for red, blue and green.

The examinations have been repeated in their entirety at least twice with an interval of several weeks, sometimes they have been taken three or four times. These investigators have been very careful to avoid fatigue; it having been shown by Schiele that prolonged examinations of the visual fields which showed contraction in one eye seemed to cause an apparent retraction of the identical dimensions of the visual field of the other eye. Likewise, in the course of the same examination if the patient complained of fatigue, further research was suspended. Thus, they have in a total of about three hundred wounds of the head, segregated more than thirty cases, in which there were disturbances of the visual fields presenting the characters to which they

have called attention and have grouped under the headings listed above.

In conclusion they say that their observations have not only a theoretical interest, but from the therapeutic point of view they are of definite importance.

First. The establishment of modifications of the visual field has always been associated with the use of the radiograph. In more than half of the cases this has shown the presence of an intracerebral foreign body that was not suspected.

Second. They believe that the measurement of the visual field with the recognition of a hemianopic scotoma furnishes valuable means of the earlier recognition of an intracerebral suppuration. The rapid development of a scotoma should make one think of the possibility of abscess.

Third. The latter circumstance is a contraindication of surgical intervention in the majority of cases, even if there is a foreign body as revealed by radiograph; because the operation involves a greater risk of increasing the deficit in the visual field, and there would not be as a result any advantage gained by such an operation.

GEORGE A. MOLEEN.

**Roche, Charles.—Unequal Pupils in Lesions of the Macular and Paramacular Region.** (Archives d'Ophthalmol. Vol. 35, Sept.-Oct., 1917, p. 680.) With the exception of syphilitic atrophy of the optic nerve and those cases in which the inequality of the pupils is due to central nervous lesions, the pupils are, as a rule, equal, even tho there may be great differences in the vision of the two eyes. The inequality noted by some observers in monocular atrophy of the nerve is so slight that it can be noted only under certain light conditions. The anisocoria of which the author writes is so apparent that it invites recognition.

He gives the histories of nine cases in which the macular or paramacular region is involved, in all of which the inequality of the pupils was evident. Some of these were cases of a traumatic nature, such as injuries from shells or a



blow with a stick of wood; others were of unknown etiology, and one was a case of retinal detachment. All of them concerned the macular or paramacular region. Cocain mydriasis and pilocarpin myosis did not alter the relative sizes of the pupils, but eserine produced such a maximal myosis that no difference between the sizes of the two pupils could be observed. The larger pupil was always in the eye showing the macular or paramacular changes, irrespective of the total amount of disease present in the two eyes, or the relative amount of vision present.

The author does not admit a primary lesion of the pupillary sphincter in explanation of the phenomenon, as the anisocoria is seen in medical as well as in traumatic cases. There must exist either a paralysis of the constrictor, or a contraction of the dilator. If the dilatation is due to a break in the motor path the break must take place at the posterior pole of the eye where the anatomic lesions present themselves. This is the place where the short ciliary nerves enter the globe, and to compress the rich plexus formed by these fifteen nerves the lesion would have to be much larger than those generally seen in the cases reported. Besides that would mean increased pressure, and in one case of retinal detachment and others the tension was minus. Besides, the pupillary reflexes, even tho they be slow when the diseased eye is illuminated, are very active when the sound eye is illuminated.

The theory that the mydriasis is due to a hypertonus of the dilator seems the real and easy explanation. Whereas a marked amount of compression is necessary to inhibit the motor impulse, the slightest amount of "irritation," such as a subchoroidal effusion, a bloodclot, or the dragging of a scar, is sufficient to produce contraction. As the pupillary sphincter retains its function the mydriasis will be of a moderate degree only; and contraction of the pupil will ensue whenever any myotic, light, or convergence are brought to bear. In the same way any mydriatic

adds its effect to the already existing dilatation proceeding from the posterior pole. The dilatation is probably due to the direct excitation of the sympathetic fibers by the lesion in the posterior pole. The fact that the inequality of the pupils can and did disappear in two of the cases recorded, proves that it was due to an irritation, and not to a paralysis.

M. W. F.

#### **Alt. Adolf.—Calcium Chlorid in the Internal Treatment of Glaucoma.**

(*Amer. Jour. Ophth.*, Oct., 1917.) The writer calls attention to the translation of an article by Weekers which appeared in 1912, but which has attracted little attention. Since then he has had occasion to employ calcium chlorid internally in about a dozen appropriate cases, that is, cases in which for some definite reason, an operative interference was not practicable, or cases in which the patient simply flatly refused to have any kind of an operation performed; some of these were of the acute inflammatory type, and some of the simple chronic form.

After the ingestion of the calcium chlorid almost every one of these patients showed within 24 hours a decided improvement in the glaucomatous symptoms. It was almost the rule that the severe pain in the inflammatory cases became much reduced or actually disappeared in 24 hours. The high intraocular pressure, also, was reduced. Of course, miotics were also used in all these cases, but in some a marked improvement started in with the exhibition of the calcium chlorid.

As Weekers pointed out, one cannot very well say that the beneficial effect is due to the calcium chlorid alone, yet it has been marked enough to convince that it should be used and be given a full trial in appropriate cases. Weekers recommended the use of 15 grains three times a day; the writer has, in a few instances, prescribed considerably more than a drachm a day; the remedy has been taken for months without discomfort.

Gowland of Buenos Aires used it in 2 per cent solution injected in doses of 2 cc. subcutaneously into the gluteal region

and says: "Such injections are painless; are followed by a slight rise in temperature; the intraocular tension is diminished; the pain disappears in from two to three hours; there are no gastric disturbances." C. H. M.

**Weekers.—Sympathetic Ophthalmia and the War.** (Archives Méd. Belges, March, 1917, No. 3.)

In more than 800 cases of ocular injuries during the war Weekers has observed no case of sympathetic ophthalmia. He questions whether statistics previous to the war have not confused simple sympathetic irritation with sympathetic ophthalmia (typical sympathetic uveitis).

When the ocular injury is such as to permit conservation of the globe the author institutes conservative treatment. But after waiting a month or six weeks, if the injured eye remains painful and irritable ablation is considered. If, in the meantime, atrophy of the globe and exudative iridocyclitis develop removal of the eye becomes necessary without delay. In such cases Weekers does an exenteration.

DANIS.

**Hughes, H. S.—Attack of Acute Glaucoma after Use of Holocain.** (Amer. Jour. Ophth., May, 1917.) The patient was a woman, aged 34, who had chronic glaucoma and whose condition the author watched for about 12 years. One per cent holocain was used in each eye before taking the tension with the McLean tonometer; three drops of fresh solution were used in the right eye and two in the left. Two hours after the tension was taken, the patient developed acute glaucoma in both eyes. The author attributes the glaucomatous attacks to one of three things:

First. A profound mental impression may have been made upon the patient by putting her upon a table and working over her with the tonometer to such an extent as to depress her sympathetic nerve poise with the above result.

Second. She might have developed this attack the day she came to the office and my investigation may have been unfortunately coincidental.

Third. The holocain used anesthesiologically may have been responsible. He concluded that the holocain solution was responsible for the condition.

J. M. WHEELER.

**Argañaraz, R., and Belgeri, F.—Sarcoma of the Iris.** (Archivos de Oftalmologia Hispano-Americanos.) Among 150,000 cases in the Eye Ward of the Buenos Aires University, there have been only two cases of primitive sarcoma of the iris. One described some time ago by Dr. Lagleyze, and this one described by the authors, giving thus 1 for every 80,000 cases, while Hirschberg gives 1 for every 85,000 and Komoto 1 for every 3,500 cases. There are in all about 12 cases of leucosarcoma of the iris in the literature. The case described was in a young French woman 28 years old, who 11 years previously had suffered a heavy traumatism over her right eye, and six months afterwards ocular disturbances began to be noticed. The symptoms increased and when seen vision was absent and there were violent pains, the eye being edematous and inflamed. Enucleation was done and the histologic findings were diagnosed as follows: perithelial angio-sarcoma.

F. M. FERNANDEZ.

**Butler, T. H.—Spring Catarrh; Its Diagnosis and Treatment with Radium.** (Brit. Jour. Ophth., July, 1917.) The writer's reasons for presenting this paper are that the diagnosis is not always made in atypical cases, and that it is not generally recognized that radium is a specific for this disease. An examination of the smear from the conjunctival discharge (the slide being fixed with alcohol and ether and stained with eosin) will establish the diagnosis since there is constantly present a large number of eosinophil cells. It is possible to confuse an atypical example of phlyctenular conjunctivitis with spring catarrh clinically, but an examination of the smear will clear up any doubt. The differences between spring catarrh and trachoma are pointed out and also the fact that the two diseases may coexist.

The writer mentions the various plans of treatment, all of little value until radium was used; he tried the total exclusion of air recommended by Beyer, and found it helpful but not curative. He gives the histories of two patients who had spring catarrh to illustrate the mode of application of radium. The first case was treated as follows: A tube containing 45 mgm. of radium bromid was applied to each everted upper lid for five minutes and repeated after three weeks; after a month there were neither subjective nor objective symptoms. The second patient received applications of small square varnished plates each containing 7 mgm. of radium bromid; these were applied to the lids and to the borders of the cornea from 8 to 15 minutes, and the applications repeated; all subjective symptoms disappeared and the circumcorneal elevations were much smaller.

In conclusion, the writer quotes Sir James Mackenzie Davidson: "I may say that in every case, without exception, which I have treated with radium the plaques have completely disappeared, leaving no scars at all. In a few cases the eye has continued irritable and injected, but the appearances characteristic of the disease have not appeared. I look upon radium as a specific for spring catarrh."

C. H. M.

**Seto.—Influence of Eel Blood Serum upon the Eye.** (Nippon Gank. Zasshi, Jan., March and May, 1917.) This is the close of his series of communications. He first shows the influence upon the pupil of rabbits by local and intravenous injection of the eel blood. In a few minutes after injection of eel blood serum into the ears of rabbits, strong myosis appears (1.5 to 2.0 mm.), but this does not occur from dropping it into the conjunctival sac nor by touching the bulb with the serum. Myosis appears by injection into the cornea, into the vitreous and anterior chamber, more pronounced in the operated eye. This myosis may be rendered most pronounced by simultaneous subconjunctival injection of adrenalin solution and by electrical irritation of the sympathetic of the neck. Atropin does

not counteract serum myosis. The blood vessels of the iris are found to be greatly enlarged, and albumin appears in the aqueous humor even to twenty times its normal amount. Examination by Psimski's method demonstrates undoubtedly dilatation of the blood vessels of the rabbit by eel blood serum. Deep narcosis by chloroform causes greatly contracted pupils to enlarge about a millimeter. Bleeding from the choroid likewise allows the pupil to dilate slightly. From his many experiments, the author concludes that the myosis is due to irritation of the sphincter muscle cells and to the dilatation of the blood vessels. Eel blood is a poison to the blood vessels by instillation into the conjunctival sac, and also, by injection into the anterior chamber, causes changes in the choroid and the internal retinal layers.

KOMOTO.

**Moret.—Ocular Troubles with Spirochetosis Ictero-Hemorrhagica.** (Archives Méd. Belges, Dec., 1917, p. 1105.) The more serious forms of this disease are accompanied with different ocular troubles. During the acute period of the disease (the congestive stage) one meets with vasomotor troubles, and conjunctival congestion (not inflammatory) corresponding to congestion in the uveal tract, retina and optic nerve, and hemorrhage of the conjunctiva and deeper membranes. In thirty severe cases of this disease the author observed two cases of true iritis. In the anemic period of the disease one finds asthenopia and muscae volitantes; and the ophthalmoscopic examination reveals an anemic retina, and sometimes a neuroretinitis.

DANIS

**Penichet, J. M.—The Vaccine Treatment of Trachoma.** (Crónica Médico-Quirúrgica de la Habana, January, 1918.) Referring to a previous paper by Demaria, of Buenos Aires, concerning the vaccine treatment of trachoma, Penichet gives his results in ten uncomplicated cases of the disease, that were treated with seven subconjunctival injections each, of a solution containing the trachoma material. The injections



were made at a week interval and in every case there was complete failure after the seven injections. The other five cases that had ulcers of the cornea and pannus and received some injections of the same material did improve slightly after the treatment, but not more than with any other procedure. Penichet concludes that the vaccine treatment of trachoma so far is not to be followed by any good results.

F. M. FERNANDEZ.

**Jocqs, R.—Persistent Treatment of Unpromising Conditions.** (*La Clinique Ophtalmologique*, June, 1917, v. 22, p. 323.) This writer maintains that it is brutal not to extend some hope of relief to the patient, and persistent therapy alone will maintain the morale. In corneal leucoma, the steady use of mild irritants clears the scars to a marked extent. This, the author demonstrates in the two varieties of patients treated at his clinic. The first group are those from the industrial plants who receive a pension according to the diminution of vision caused by the cicatrix, but are

subject to revision at the end of three years. These patients never follow the treatment for fear that their vision might improve and thus decrease their receipts. The second class are the railway employes who follow precisely all medication, as they are not subject to revision and the reduction in occupational grade is not compensated by the small pension allowed. The first group remain almost stationary, while marvelous results as to the thinning of scars is seen in the conscientious.

We all hesitate to treat the cataract by medicinal means and when this is done there is little confidence in the results. And yet those surgeons who have persistently used potassium iodid as a collyrium have all had some benefit in certain cases. This, however, is a procedure of months and years.

The article concludes with a query as to the number of clinic cases prescribed for in a rather hopeless fashion and yet after a long absence, these same individuals return with a most unexpectedly good result. (The moral of this tale is to keep on trying.)

J. S. W.

## SOCIETY PROCEEDINGS.

### CHICAGO OPHTHALMOLOGICAL SOCIETY.

December 17th, 1917.

DR. PAUL GUILFORD, President, in the Chair.

#### Chronic Hypertrophic Conjunctivitis.

DR. E. R. CROSSLEY presented an unusual case of chronic hypertrophic conjunctivitis. The patient stated that about one year ago the left eye became inflamed and congested with profuse lacrimation which continued for eight or nine months. At that time the patient noticed an enlargement and thickening of the upper lid which has

continued to the present. He came to the clinic for treatment about one month ago.

It was with difficulty that the lid was turned on account of thickening. The surface presented a somewhat irregular, rather nodular appearance, to be differentiated from: tuberculosis; Parinaud's conjunctivitis; and possibly trachoma. In a tubercular conjunctivitis there would be found numerous grayish ulcerated surfaces which were not present. In Parinaud's conjunctivitis the swelling usually extends to the retrotarsal folds and conjunctiva of the eyeball. Onset is accompanied by temperature and the preauricular as

well as the parotid glands are swollen and not infrequently suppurate. These symptoms were not present. The characteristic granular bodies of trachoma were not present.

The patient was sent to the laboratory and smears as well as cultures were made from the surface. No organism was found in either smear or culture. A section was taken from the thickened tissue and sections made by Dr. Lane.

**DISCUSSION.**—Dr. Francis Lane said that for the proper understanding of a disease of an organ it was essential to know the embryology, normal histology and pathology. There were three types of cells which were found in normal conjunctiva—those of hemic origin, cells of connective tissue origin, and others of doubtful origin. Cells of hemic origin are polymorphonuclear leucocytes, not found in any great quantity in normal conditions; but in some suppurative diseases they are found in large numbers, most frequently near the basement membrane. Another cell which we find is the eosinophile; not in any great number except in certain pathologic conditions, in spring catarrh particularly. Another cell of hemic origin found is the mast cell; not very many and not markedly proliferated in any of the pathologic subjects studied in the last fifteen years.

The connective tissue cells found are the fibroblasts, which vary in shape and size. As a rule, the superficial ones are more elongated and the deeper ones more round. The cells which interest us particularly are the endothelial and perithelial, found in the superficial layers of the substantia propria. In any inflammatory condition they proliferate very rapidly. They are apparently ameboid, because they go thru the blood vessels and proliferate outside. Other normal cells are large and small mononuclear lymphocytes, probably originating from the endothelial, the cells lining the lymph gland. The large are found wherever the small mononuclear lymphocytes are found, and probably proliferate wherever the infection is. The relation of the small

and large lymphocytes is not well understood; the large are probably an enormous development of the small lymphocyte.

The cells that are not found in the normal conjunctiva under normal conditions are the epithelioid cell and giant cell. The giant cells are of two types, those which originate from the plasma cell and those which originate directly from the endothelial cell. In the specimen Dr. Crossley gave him there were plasma cells and a few polymorphonuclears finding their way thru the tissues. There was an enormous development of the plasma cells. There were three types, the ordinary type, the large or clasmatocytes and one or two giant cells, chorioplaques, which evidently originated from endothelial cells. The specimen had been taken so that the sections were made transversely. The specimen was five or seven by about ten millimeters. The specimen showed thickened epithelium cells, but the striking feature was an enormous overdevelopment of plasma cells indicative of chronicity. There was a moderate amount of old connective tissue formation. For the want of a better name the type had been described in 1908 or 1909 by Parchet, by Shoemaker and later by Elschmig as a chronic hypertrophic conjunctivitis or conjunctivitis plasmacellularis.

#### **Embolus of the Macular Artery.**

DR. E. V. L. BROWN reported a case of embolus of the macular artery and exhibited the patient.

The patient, a man aged twenty-six years, married, with no children; was coming down town on a street car fourteen days ago at about seven o'clock a. m. He had been reading and on looking out of the window suddenly discovered that his left eye was blind. Examination four or five hours later showed a small hemorrhage just above the macular artery near the disc, with edema of the disc and macular area, the blood flowed thru all portions of the vessel. There was a typical "cherry-red spot." There was distinct evidence of arteriosclerosis of both retinal vessel systems, not only kinking of veins by arteries, but distinct tortuosity of the smaller vessels, without

which the diagnosis of arteriosclerosis, according to some authors, should never be made.

A physical examination elicited no general arteriosclerosis, and only the temporal arteries felt hardened. Blood pressure was 115-80. The teeth were found sound by x-ray examination and clinically. The Wassermann reaction was negative in both the Presbyterian and Cook County Hospitals, on both the blood and spinal fluid. There was no evidence of tuberculosis. The tonsils were found to contain pus and were removed on December 14th. There had been a slight albuminuria but after the removal of the tonsils no albumin was to be found. There had been no abnormal temperature and the patient felt well after the tonsillectomy. Two days before the tonsillectomy the hemorrhagic area was distinctly to be seen but now unless told that hemorrhage had been present none would be suspected. The edema was not nearly so marked as it had been a few days previously, and the "cherry-red spot" barely discernible. There has not been any return of vision.

#### **Iridotaxis for Primary Glaucoma.**

DR. THOMAS FAITH presented a patient on whom he had performed an iridotaxis for primary glaucoma.

The patient was a woman, aged 29 years, who consulted him in 1913 for primary glaucoma of both eyes. The right eye was very much the worse with vision something like 4/200. A trephining was done on the right eye some time in the fall of 1913 which apparently reduced the tension, but it was followed within a month or two by complete detachment of the retina. In February, 1914, the eye was enucleated on account of pain and increase in tension.

The left eye was kept within reasonable bounds of tension with eserine, but the strength of the solution had to be continually increased until in the fall of 1915 the case reached the point where the tension was not kept in check even with four grain to the ounce of eserine. It would be as high as 56, then go down to 40.

In January an iridotaxis was done. For five or six days the tension to fingers was

normal, and then went up. No eserine was used immediately following the operation but after a few days it was used and the tension immediately came down and has remained normal ever since. The patient has used no drops for many months, and the tension now is 15-20-25, whenever taken, vision 20/30. It will be two years in January, 1918, since the operation.

He felt that this operation accomplished one of the things wished for, and that was a new route for drainage, which was accomplished better than by trephining, and with much less subsequent danger of infection. We all know from experience that many patients have a prolapsed iris in case of injury, but secondary infection is rare. He had seen only one case of late secondary infection after iris prolapse. That was shown, a number of years ago, by Dr. Gradle, Sr., who had reported two cases of late secondary infection, in cases of prolapsed iris.

DISCUSSION.—Dr. Michael Goldenburg considered iridotaxis the most satisfactory operation for glaucoma that he had ever seen performed. The simplicity of it appealed to anyone. There was hardly any chance of doing harm and the fact that a definite communication was established between the anterior chamber and the subconjunctival space was a distinct advantage. The only question was, did the iris remain as a drain or did it fill up with connective tissue? The operation was at present too new for a definite statement to be made, and this could only be done when some of the eyes came to the pathologic laboratory. In his case the tension had been kept down all the time.

When the operation was first reported some time ago great stress was laid upon drawing the iris up into the wound, feeling that drawing the iris away from the limbus distended the spaces of Fontana so as to permit drainage. He questioned whether this had any real value. In Dr. Faith's case the iris was not stretched very much and in his case he had not done it because he could not see any particular advantage in doing so. He left the iris in the small opening of the limbus and the tension remained down. In this operation one did not get the large



bleb as in trephining, and that was where the late secondary infection came. He had seen two late secondary infections following a trephining operation, due to the bleb where the lid rode over it constantly and eroded the superficial epithelium.

Dr. John R. Hoffman said he did not see how the iridotasis could appeal to anyone. He thought the only operation of first consideration in glaucoma was a broad iridectomy, and could not see why the iridotasis was better.

Dr. Clark W. Hawley stated that he had been trying for the last year and a half to get away from mutilating the eye. The whole subject got down to what was the cause of glaucoma. He did not mean not to do an operation and the other things that had been done in the past for glaucoma, but the cause of glaucoma had never been established. The man who first brought the subject out had been thinking along the same line, but for several years and independent of him the speaker had been studying up what he thought was the cause for many of the cases, especially the inflammatory ones, and that was some phase of focal infection. The only phase which he had met with so far was autointoxication. He had under his care five cases of glaucoma; three of them his and one of his assistant's in which no operation had been done, and all had been cured so far. He had also one case of simple glaucoma which had been improved very much. That patient had been subjected to an iridectomy by a physician in New York, but this was without any benefit. The eyes now are both very much improved and the recurring attacks were further and further apart. He was convinced that the trouble came from some focal infection, producing an inflammation which might induce an inflammatory condition of the choroid, thus producing an extra exudate and then an overflow which could not be carried off.

Dr. Risley of Philadelphia had almost ceased doing iridectomy. The inflammatory glaucoma was much more susceptible to the treatment than the simple glaucoma. An operation might be beneficial in some cases because in doing a cutting operation the inflammatory condition

would be reduced. He did not believe that the operation in glaucoma opened up the canal but it was the influence of the operation on the connective tissue which was of benefit. These four cases had all been treated entirely without operations and some were over a year old.

Dr. W. A. Fisher agreed with Dr. Hawley concerning his treatment of washing the lower bowels. He was treating a case with eserine in the eye and rectal flushing, such as Dr. Hawley suggested some time ago, and was sure that the treatment was often effective. He also agreed with Dr. Hoffman that an iridectomy was the best operation for reducing tension, provided one could always make a good iridectomy; but many could not, especially if a very shallow anterior chamber was present. He had operated a great many times when the tension was not reduced, but believed the poor result was due to an improperly performed iridectomy and he believed that an iridectomy that was done properly usually accomplished the same work as trephining.

He considered Smith's iridectomy made with a narrow cataract knife, cutting upwards instead of downwards, the best operation, as also the simplest and easiest to perform. He also agreed with Dr. Faith that an iridotasis was a good operation and possibly the best one, especially for those who operate seldom and do not feel sure of a good iridectomy. He thought the principal thing to do was to get a deep iridectomy. Dr. Faith has a good result in the case he has presented which is convincing. He thoroughly believed with Dr. Hawley that it is most desirable to use enemas in all cases, no matter what method of operation was performed or what treatment was given.

Dr. Clark Hawley stated that twenty-two years previously he had removed the eye of a patient for a severe ophthalmia. One year ago she was taken with what she described as blind spells, coming at first once a week and later once a day. In January they were as frequent as twice a day, but absolutely nothing had been done. She did not come to him for treatment because she owed him a bill. When she did come her vision was 20/200. At that time he was treating two patients

with his elimination method and wished to see what this treatment would do in such a case as hers. He treated her for four or five days with rectal enemas and since then she had not a single attack of glaucoma; from the first night there had been no attack of inflammatory glaucoma. He thought it was far better to get at the cause of the disease and treat it than to operate. But he thought this treatment could not be carried out with cathartics. When the autointoxication was cured the patient got well.

Dr. Thomas Faith thought it would be an excellent idea to have a symposium on glaucoma. The case he reported as not an inflammatory or congestive glaucoma, but the simple primary form. The patient had only one eye. She had received citrat of soda injections, a la Fischer, and everything had been done that could be done, but she was losing her vision in spite of everything. The iridotaxis has kept her vision in spite of everything. He thought that the fact that there were so many different operations for glaucoma showed that there was no perfect one. In a simple glaucoma it was either a myotic or an operation, no matter what the cause was.

He had tried the suggestions made by Dr. Hawley on this patient, but he thought if this operation always established a new route for drainage it would be a successful operation. He thought pathologists would bear him out in saying that when good results were obtained from iridectomy it was because there was a filtering scar left. He could not share Dr. Hoffman's enthusiasm for the infallibility of iridectomy. He believed that trephining often relieved the tension but thought if there was no bleb there was no result. In one case of trephining of both eyes, that of a woman over sixty, who had gone along for two years without a secondary infection and with the tension normal, tension remained in proportion to the size of the bleb she had, which varied from time to time. In this case of iridotaxis there is a bleb surrounding the iris, not as large as you get with trephining but of good size, and when the bleb is larger the tension is lower.

#### **Cataract Extractions.**

DR. W. A. FISHER reported two cases

of lens extraction, one of which was cataracta nigra. The first was Mr. V., aged 57 years, whom he had operated on for cataract four weeks previously. The lens was removed without any complication and it proved to be a cataracta nigra. He naturally expected 20/20 vision because the lens was removed in capsule and there was no postoperative inflammation. The principal point he brought out was the existence of a sluggish pupil which was explained to the patient before operating. Another point was that the nerve head after operation appeared pale, as if he might have atrophy, but he did not know what a normal field was after a cataract operation. He thought it would be an important point to establish the normal field after a cataract operation, because if a field was contracted below this normal, one could distinguish an atrophy and be sure of it at once as easily as could be done if the lens was in the eye, but a standard must be first made.

The second case was a man, aged 70 years, who had come from a long distance, and did not have sufficient money to remain in the hospital a long time for treatment. The right lens was mature, the left vision 20/200. There was a dacryocystitis in the right eye and the left was clean. To have operated upon the right mature lens, it would have been imperative that the lacrimal sac be operated upon and free from bacteria before operating for cataract.

He prevailed upon the patient to have the clean eye operated upon as he could do it at once and not decrease his prospects of good vision. The left eye was operated five weeks previously and he now has 20/25. The lens was so large that it seemed impossible to remove it without danger and the needle was used to assist delivery. This ruptured the capsule but when the lens is pushed up into the opening and the needle is used even if the capsule ruptures, all of the cortical usually comes out. By removing the lens in capsule, it would seem that an immature cataract would be selected rather than a mature when the mature was complicated by a dacryocystitis and the immature clean. The lids were not opened in either of these cases until the ninth day

and neither of them had any postoperative inflammation.

Dr. Francis Lane thought that after the lens was extracted the iris did not hang forward but would drop down as a curtain because it had no support. It might cut off some of the peripheral field but still it would be functioning. It would be pushed back towards the center of the eyeball.

Dr. W. A. Fisher was pleased to know that Dr. Lane believed that after the lens was removed in capsule it did not draw up so high that the patient could not see at all, but instead dropped back. He considered the fields very important and stated that in a field taken from Mr. H., who had practically a normal eye with the lens removed, that the fields appeared to be contracted.

He had taken two fields, exhibiting chart, one with and the other without correction, and they were practically the same. In the other case, Mr. V., in which he suspected an atrophy because of the whitening of the nerve head, the fields were the same as in Mr. B.

#### **Monocular Diplopia.**

DR. L. J. HUGHES reported a case of right monocular diplopia. The patient was a male, hunter, 57 years of age, who had complained for three or four years. In the right eye vision was 20/30 with correction; in the left 20/20 with correction. Examination of the right eye showed it to be normal so far as it could be made out; he only had the patient's word that he saw double. He claimed to have seen the gun barrel double. He had tried him with correction with no effect on the diplopia but a mydriatic removed the diplopia. He used this before he went hunting. Dr. Hughes thought it might be a case of hysteria; the patient claimed that objects changed their shape. When shooting at clay pigeons they might be horizontal at one point and vertical at another.

Dr. W. A. Fisher said that in his experience with injuries, the patient would occasionally complain among other things of double vision with the uninjured eye, but he believed the principal incentive was to make a better settlement for the injury. He could easily understand that candidates for the army or

navy might some times complain of double vision with one eye, but that would probably be for exemption. He did not believe one with a seeming normal eye as the one Dr. Hughes presented, could possibly have diplopia with one eye, and it must be a neurosis.

Dr. Clarence Loeb asked if the patient saw two objects side by side or one over the other.

Dr. Hughes, in replying to Dr. Loeb, said that he had to take the patient's word for it that he saw double at all, and he thought it might be psychic. He saw one image quite distinctly but the other was more like a shadow.

Dr. Thomas Faith thought it was an accepted fact that monocular diplopia must be due to something interfering with the lens or vitreous, or hysteria. He had seen one case of monocular triplopia.

Dr. Hughes stated that in a young woman of 25 years, following an attack of typhoid fever, there had been trouble with both eyes in which so many objects appeared, all horizontal, that she could not count them and they were always present, more or less oscillating. He could never find any pathologic lesions to account for it.

MAJOR H. WORTHINGTON,  
Secretary.

#### **WILLS HOSPITAL OPHTHALMIC SOCIETY.**

January 7, 1918.

#### **Sarcoma of Orbit.**

DR. WM. CAMPBELL POSEY presented a case of sarcoma of the orbit in a man 54 years of age, who had been struck on the head and eye some 10 years previously by falling timber. The affected eye had been enucleated elsewhere some four years previously, perhaps for sarcoma of the choroid, though the cause of blindness in the organ and the reason for its removal were unobtainable. The recurrence of the growth in the orbit, if such was the sequence, presented an unusual form, the tumor appearing as a firm black rounded mass, which occupied the position of the eyeball and extended downwards and forwards, resembling in its posi-



tion and form a microphthalmic eye with attached cyst below. The mass was removed in toto by Dr. J. Milton Griscom in the absence of Dr. Posey, and the contents of the orbit eviscerated. Copious hemorrhage attended the operation and recurred at each dressing. Two weeks after the operation, the orbit was subjected to a thorough electrical dessication treatment by Dr. Clark, since which time the hemorrhages have ceased, and the orbit now shows signs of being filled in with newly formed tissue.

### Optic Neuritis.

DR. POSEY presented a woman, aged 26, who had been married five years and had three children living and well, no miscarriages, with cerebral syphilis and marked papillitis in each eye. Vision was reduced in the right eye to 1/60 and in the left eye to 3/60. Fields of vision are concentrically contracted for form; colors not discernible. No symptoms present except intense headache and loss of vision, which had come on rapidly, but with interruptions of spells of apparently normal sight. Wassermann +, von Pirquet negative. Rapid improvement followed a rigorous course of mercurial inunctions, so that in four weeks there was a marked reduction in the papillitis and vision equaled 5/9 in each eye.

### Salvarsan in Causation of Optic Neuritis.

DR. POSEY said that for a long time there was a general impression that Salvarsan acted deleteriously upon the tissues of the optic nerve, and especially in the presence of nonsyphilitic disease of the retina and optic nerve. Gibbard, however, who investigated this phase of the subject, observed but two cases of cerebro-nerve disease in 1,200 cases in which Salvarsan was used and an increase of dosage caused a disappearance of the trouble. Elliott, moreover, found that cases presenting signs of optic neuritis of presumably syphilitic origin act excellently in response to the drug. Further search of the literature also indicates that there is no ground for the belief that Salvarsan has a poisonous effect on any of the ocu-

lar tissues. Certainly all evidence is lacking that the drug causes atrophy of the optic nerve thru direct toxic effect. Dr. Posey said that from his own limited experience, it would appear that the toxic effects wrongly attributed to Salvarsan may be avoided by trusting the administration of the drug only to those who are properly trained, and that the combination of Salvarsan with Hg. and K. I. greatly augments the spirocheticidal properties of each of these specifics. In order to be efficient, Salvarsan should be administered early, before the spirochetes reach the vascular tissues, and before they have time to damage the delicate tissues of the eye. Later results are certainly less favorable, tho we have all seen gummata of various parts of the eye disappear under its use. Indeed, cases have been reported where Argyll-Robertson pupils have reacted again to light following intravenous injections of the drug.

Dr. Posey referred to Knapp's paper read before the American Ophthalmological Society in 1916, in which the author lauded the employment of Salvarsan in eye syphilis. The author gives his patients mercury by inunction once or twice daily, small doses of K. I., and Neosalvarsan in five one-half doses at three day intervals; then after two weeks, Salvarsan is given in one-half doses every three days for five times. The Hg. and K. I. were then continued. Knapp states that the Wassermann test did not help him in determining the effect of the treatment, as in all of these cases it remained strongly positive, as has been the experience of all laboratories. He employed intraspinal treatment with salvarsanized serum in order to bring the agent into close contact with the diseased tissues in five cases of optic atrophy, but in one only was there any improvement.

A paper by Fordyce of New York, read in Philadelphia last year, was commented upon by Dr. Posey and his conclusions quoted as follows: "Optic atrophy with a high cell count, positive Wassermann and a luetic curve, offers favorable conditions for treatment, as is evidenced by the fact that cases have been stationary for two years with negative findings after treatment, and with visual

fields enlarged or stationary." On the other hand, he believes that optic atrophy with negative fluid findings offers no indication for intraspinal treatment.

Fordyce insists that every case of secondary syphilis as a matter of routine should have an ophthalmoscopic examination from time to time. Marked evidence of pathologic changes may be present with slight subjective symptoms or impairment of vision, and the condition may be completely overlooked unless one is on the alert for the possibilities in these cases.

### Magnet Extraction.

DR. FRANK C. PARKER presented an interesting case of magnet extraction in a man about 25 years of age. The patient presented himself in Dr. Posey's clinic, with a history of having been struck in the right eye by a foreign body while using a hammer, twenty-four hours before admission. External examination showed only a small elevation of the limbal tissues up and in, resembling a very small pinguecula. A faint pink flush over this spot was the only visible discoloration. The iris was drawn slightly toward the seat of injury. Tension normal. No pain. Vision but slightly impaired. Ophthalmoscopic examination disclosed a glistening black foreign body, up and in, and posterior to the lens margin. It floated freely in the anterior vitreous.

It was decided to apply a magnet at once, the blunt tip of the Parker magnet being held directly over the projection at the limbus. Upon turning on the current a small foreign body immediately dislodged itself from the limbal thickening and attached itself to the magnet. The ease with which the foreign body had been removed led to the suspicion that possibly all was not well. A second examination with the ophthalmoscope showed the original foreign body occupying its former position. While viewing the foreign body the magnet was turned on and off several times. Each time the current was turned on, the particle could be seen to jump toward the magnet and then fall back to its original position. It appeared to slide back and forth in a minute canal in the vitreous, produced

at the time of the injury. At no time did the body appear to change its position save when the current was turned on. Had the vitreous been fluid, conditions would probably have been different.

Attempts were made to draw the fragment through the pectinate ligament, behind the iris and thru the pupil, but the bulk was too small to offer sufficient attraction to overcome the resistance of a healthy ligament. Therefore a posterior sclerotomy was done and the fragment extracted with ease. Two weeks later vision = 6/9.

### Glaucoma Trephining.

DR. WM. ZENTMAYER presented a case of glaucoma treated by the trephining operation. The patient, a laboring man, 47 years of age, discovered in January, 1915, that on closing the left eye he could not read. He recalled that during the previous summer there was a blurring of the right eye and that it was somewhat congested, but not painful.

The right eye was operated upon by Dr. Hardy of St. Louis, in April, 1915, who did a trephine operation. The patient thinks that vision was not improved thereby. For two years past he has seen halos with the left eye. He was first seen by me in March, 1916. At that time the vision in the right eye was 20/40, and in the left eye 20/20.

Fields: Right eye, a triangular sector, apex at fixation and 60° wide at its temporal base. Left eye, almost a nasal hemianopsia with fixation preserved.

The right eye showed a filtration area including the whole conjunctival flap, over which the conjunctiva seemed thin. T. = 13 mm. There was a small basal iridectomy. Papilla partly atrophic with a very deep pathologic cup. Left eye T. = 39 mm., papilla gray, deep pathologic cup. He was given pilocarpin and was not seen again for one year, when vision and fields were about the same.

He was again seen in December, 1917, when he stated that for the past three months there had been a fog before the left eye which by noon each day became so dense that he had to depend upon his right eye. On examination the left eye showed a hazy cornea, pupil partly dilated, and a tension of 53 mm. Right eye,

tension 12 mm. The field of left eye was contracted to a narrow trowel-shaped area extending from 5° on nasal side to 60° on temporal side and widest dimension of 25° near fixation point.

On December 15, 1917, the left eye was trephined and a basal iridectomy secured. There was considerable reaction. At the end of the second week V. = 15/20, and the field had increased about 10°.

The case was exhibited particularly to illustrate the course of a case in which a classical operation and operative result had been obtained almost two years before. The central vision has held up well but the field is gradually contracting. Tension is normal and there is a large filtration bleb.

HAROLD W. HOW,  
Secretary.

## SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

November 15, 1917.

DR. S. LEWIS ZIEGLER, Temporary  
Chairman.

### Nodular Degeneration of Cornea.

DR. WILLIAM ZENTMAYER presented a patient who was a married woman of Polish birth. The history of the case was difficult to get, but it would seem that the vision began to fail soon after the birth of her first child, four years ago. She had a second child, about two years ago, and since then there has been a further, more rapid loss of vision. No knowledge of injury or severe inflammatory symptoms.

In the right eye there was an irregular horizontal sigmoid opacity, measuring 1.5 by 4 mm. in the center of the cornea. This was surrounded by many small round or nearly round dots, measuring about 0.5 mm. in diameter, arranged in an irregular circle about the larger opacity. The intervening spaces and the rest of the cornea were studded with pin point opacities. The location of the opacities was sub-epithelial, but only in one or two places was the epithelium distinctly elevated.

In the left eye the opacities were of a more uniform size, and there was a distinct tendency to whorl arrangement. Their color was a dark gray.

In both eyes the retinal vessels, especially the veins, were distinctly engorged. There were no external signs of congestion.

The Wassermann test made last spring in the service of Dr. Chance, and recently again in Dr. Zentmayer's service, was negative. The von Pirquet was slightly positive. There was nothing relative in the family history.

### Historical Sketch.

DR. S. D. RISLEY presented a valuable and interesting historical review of the "Rise and Progress of Ophthalmology in Philadelphia." (See p. 28.) **Injury to Eyes from Lightning Stroke.**

This paper by DR. WILLIAM CAMPBELL POSEY has been printed in full, p. 88.

### Bilateral Coloboma of the Lid.

DR. WILLIAM CAMPBELL POSEY presented a case of bilateral coloboma of the lower lid associated with malformation of both superior maxillary bones. The defect in the right eye had been corrected by sewing together the edges of the coloboma. In the left eye, however, the coloboma had involved practically the entire inner half of the lid. The gap was filled in with a flap taken from the root of the nose. An associated pulling up of the right side of the mouth had been corrected by a plastic operation by Dr. J. B. Roberts.

### A Case of Epicanthus.

DR. POSEY showed 2 cases of a curious elongation of the inner halves of the upper and lower lids of both eyes in Italian children, associated with other signs of retarded physical development, small upper extremities, deafness, malformation of the skulls, etc. Dr. Posey had operated on the older child, removing the right lacrimal sac, which was the seat of an abscess, and prolonging the palpebral fissure inward by notching the weblike fold of skin which united the lids in that position.



### **Synchronous Movements of Lid and Jaw.**

DR. POSEY showed a case of synchronous movements of the jaw and upper lid of the right eye associated with divergence of the eye. The lid had been raised by a Hunt-Tansley operation and the internal rectus advanced. The ptosis being only partially corrected as a result of the first operation, a Hess procedure had been done later. The cosmetic result is now good.

### **Results of Operation for Mucocoele of Frontal and Ethmoidal Cells.**

DR. POSEY also exhibited a case showing excellent cosmetic and visual results a year after operation on a case of extensive mucocoele of the frontal and ethmoidal cells.

### **Superficial Punctate Keratitis.**

DR. SIDNEY L. OLSHO, by invitation, presented a patient, P. L., white, carpenter, aged 22 years, who showed numerous typical punctate opacities restricted to the central portions of both corneae and without any other signs of

inflammation. The disease was of four years' standing and seemed not to yield to treatment. The symptoms fluctuated in intensity and at times were almost absent. The patient was in robust health, but had a quiescent infiltration at the right apex. The upper respiratory tract was normal excepting for a slight deviation of the septum. Two of his three brothers and one of his six sisters had psoriasis.

DISCUSSION.—Dr. Zentmayer said that one point of interest in Dr. Olsho's case was its persistence, as in the several cases he had seen it had run a course of a few weeks or months. In nearly every instance there had been present, or there was a recent history of, a catarrh of the upper respiratory tract. He had found holocain to be of value.

He asked whether the collection of the leucocyte or of lymphoid cells was not also a finding in ordinary phlyctenular keratitis, which at present, at least, was not considered of neuropathic origin.

J. MILTON GRISCOM, Clerk.

# American Journal of Ophthalmology

Series 3, Vol. 1, No. 3.

March, 1918.

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to

H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

## EDITORIALS.

### THE OPHTHALMIC RECORD IN CHICAGO.

Following the régime of Dr. George C. Savage, the place of publication was changed to Chicago in the year 1896. Casey A. Wood became editor-in-chief and with him were associated Drs. Geo. E. de Schweinitz, W. E. Hopkins, G. C. Savage, John E. Weeks, F. C. Hotz, H. V. Würdemann, Harold Gifford, Edward Jackson and Frank Allport, acting as an editorial board. Others who were at this time associated in the publication of the "Record" were: Francis Valk, New York; A. W. Calhoun, Atlanta, Ga.; A. A. Hubbell, Buffalo; F. B. Eaton, San Jose, Calif.; J. W. Stirling, Montreal, Canada; Melville Black, Denver; Wm. Dudley Hall, Buffalo.

Dr. Thomas A. Woodruff acted as editorial secretary from 1897 to 1913. Dr. Thomas Hall Shastid from May, 1913, to December, 1913, and Dr. Frank Brawley from December, 1913, until the merger January 1, 1918.

The sphere the "Record" was to occupy in American Ophthalmology was determined at this time, namely to give to the profession a monthly journal which would appeal to the practical, everyday side of ophthalmology. This idea was carried out to the last issue and, emphasized with plentiful illustrations, resulted in the development of a popular journal with a subscription list of more than fifteen hundred physicians in this country and abroad.

The first Chicago office was located in the High Building, opposite the post office on Adams street, where C. C. Clute acted as publisher and business manager. This position he held until his death in 1905, when he was succeeded by H. A. Fox, who continued in charge until the merger into the new AMERICAN JOURNAL OF OPHTHALMOLOGY, and who is now associated with the new journal in the business department.

A very useful feature was incorporated in the "Record" in 1907, viz., the

table of Hospital and Teaching Clinics, published on its fifty-fourth page each month.

In addition to short practical articles, in later years, original articles presenting the purely scientific aspects of ophthalmology, were occasionally published, such as those on physiologic optics by Chas. F. Prentice, M. E., of New York.

The illustration of original articles with cuts and halftones was also encouraged and, when possible, special illustrations were done in colors.

One department in the "Ophthalmic Record" was devoted to reports of the various ophthalmologic societies, notably, the Ophthalmic Section of the Royal Society of Medicine, Section of Ophthalmology of the College of Physicians of Philadelphia, Chicago Ophthalmological Society, Colorado Ophthalmological Society, Wills Hospital Ophthalmic Society, Philadelphia Polyclinic Ophthalmic Society, Section on Ophthalmology of the A. M. A., Ophthalmology of the United Kingdom, etc.

Another valuable department was that known as "News and Notes," which was presided over at various times by Frank Allport, Frank Brawley, Emory Hill, and Chas. P. Small.

At the conclusion of its career the names of those still actively interested in the "Record" were: Editors, Casey A. Wood, Chicago; G. C. Savage, Nashville, Tenn.; Geo. E. de Schweinitz, Philadelphia, Pa.; John E. Weeks, New York; Edward Jackson, Denver, Colorado; H. V. Würdemann, Seattle, Wash.; Frank Allport, Chicago; Harold Gifford, Omaha, Neb.; Editorial Secretary, Frank Brawley, Chicago.

The collaborators were: Francis Valk, New York; F. B. Eaton, San Francisco, Cal.; E. C. Ellett, Memphis, Tenn.; C. Devereux Marshall, F. R. C. S., London, England; W. Gordon M. Byers, Montreal, Canada; Emory Hill, Chicago; Hans Barkan, San Francisco, Calif.; Melville Black, Denver, Colo.; Robert L. Randolph, Baltimore, Md.; Edward Stieren, Pittsburgh, Pa.; Clarence A. Veasey, Spokane, Wash.; E. A. Shumway, Philadelphia, Pa.; James W. Barrett, Melbourne, Australia; Frank

C. Todd, Minneapolis, Minn.; Nelson Miles Black, Milwaukee; Prof. Cirincione, Rome, Italy.

Having fulfilled its mission, the "Ophthalmic Record" is proud to submerge its identity and to bring its resources to the support of the new AMERICAN JOURNAL OF OPHTHALMOLOGY. F. B.

### ANALES DE OFTALMOLOGIA.

This journal was founded July, 1898, by M. Uribe Troncoso, with the co-operation of Daniel M. Velez, in the City of Mexico. At that time there were no ophthalmologic journals published in Spanish either in Spain or Latin America. Two special publications issued in Spain some years before had to be discontinued after a short period. All ophthalmologic papers in Spanish were scattered in the medical journals, making them difficult to locate and allowing some important papers to go unnoticed.

The principal aims of the *Anales de Oftalmologia* were to create a common channel of publicity for Mexican, Spanish and South American ophthalmologists, to stimulate scientific activity among them and to promote a wider and better knowledge of their respective work. The *Anales* secured the co-operation of such men as Dr. J. Santos Fernandez of Havana, Dr. C. A. Oliver of Philadelphia, Dr. L. Demichieri of Montevideo, Dr. Wernicke of Buenos Aires, and Dr. P. de Obarrio of Guayaquil, Ecuador. This journal was assisted at first in a financial way by a subsidy from the Government of Mexico under the form of free printing in one of the government printing houses, the cost of paper, cuts, etc., being nevertheless paid by the publisher.

In addition to original articles, the *Anales* began to publish complete reviews of the world's most important ophthalmologic literature, reports of societies, items of interest, etc. American ophthalmology was well represented by monthly abstracts and reviews from Dr. C. A. Oliver, assisted by Dr. Burton K. Chance, which certainly contributed a good deal to make it known amongst



Spanish speaking oculists, to whom the English language was not familiar.

Two years afterwards the *Anales* were widely known. Professor Hirschberg asked Dr. Wernicke to make abstracts for the *Centralblatt für praktische Augenheilkunde*, and French, English and American journals published abstracts of its most important original articles. About this period Dr. Menacho of Barcelona and Dr. J. Santos Fernandez of Havana, believing the circulation of the *Anales* was insufficient in Spain, conceived the idea of transferring the journal to Madrid, another reason also being that Spain, as the mother country of Latin America, could obtain better support for the journal.

Dr. Uribe Troncoso, however, after due consideration of the matter, did not agree to the proposal, being of the opinion that the *Anales* could do better work for Mexico and Latin America by remaining in Mexico, and also on account of the numerous connections and obligations established. Drs. Menacho and Santos Fernandez then started the *Archivos de Oftalmologia Hispano Americanos*, first in Madrid and then in Barcelona.

The old Mexican Ophthalmological Society, founded about the year 1892, was reorganized in 1901 and all its papers and proceedings were afterwards published in the *Anales*. An annual meeting was added in 1903 to the monthly sessions in order to convene ophthalmologists from all over the country and the journal was then of great assistance, not only for the announcement of the meetings but also in the publication of the society proceedings that were made from reprints of the journal at a very small cost. Galley proofs of the proceedings were also sent to many ophthalmologic journals, which published them in full.

In the small and sparsely settled towns of many Mexican states, eye specialists are totally lacking. The result is that such common diseases as ophthalmia neonatorum, iritis, glaucoma, etc., go untreated, or ill treated, and blindness is very frequent. Having in view the diffusion of ophthalmologic knowledge, the *Anales* undertook, in a special section, the publication of clear, precise and

practical articles, dealing with the most important ophthalmic subjects, that should appeal to the general practitioner much more than the elaborated and highly technical articles for eye specialists. In 1913, even a small book by A. Cantonnet was published in several numbers under the form of an appendix, entitled "Ophthalmology for the General Practitioner." Copies of the *Anales* were sent to a large number of general practitioners all over the country.

In 1899 the editor started an editorial campaign calling the attention of the government of Mexico to the need of a systematic examination of the eyes of railroad employes engaged in the moving of trains; and in 1900, when the Section on Ophthalmology of the American Medical Association through a special committee settled the rules and regulations to which the examinations must conform, Dr. Uribe Troncoso again took the matter in hand and obtained the incorporation in the new "Rules and Regulations for the Mexican Railroads" of some provisions for compulsory examination of the eyes of these employes.

Many important topics of school hygiene were also treated in the *Anales*, which warmly supported the movement for systematic examination of the eyes of school children.

On the tenth anniversary of its foundation a special number was published, which contained the opinions of many oculists concerning the past policy of the journal, and suggestions with regard to its future.

During seventeen years the *Anales* kept its standard, struggling with success against material difficulties and scanty support. In fact, it was the only special journal published in Mexico; no other department of medicine being represented in the medical press, outside of the general medical publications.

In 1913 the life of the journal was endangered by the revolution; the cost of the paper and other supplies became excessive; the number of subscribers diminished to a great extent on account of the suspension of postal money collections and the unfortunate condition of the country. For two years the *Anales* were published with great irregularity,

struggling against very adverse conditions. The last number closed the Volume V, when its chief editor decided to transfer his activities to New York City. M. URIBE TRONCOSO.

### OPHTHALMOLOGY—1904-1917.

The year 1904 saw most medical journals of America in the hands of lay publishers, whose policies were not quite in accordance with the ethical and scientific demands of the medical profession. From this time on there has been a great improvement in these conditions, and most of the journals have come under full direction of the medical men and have more than filled their demands. Therefore, some years ago, a movement arose, gradually growing in force, towards more full efficiency, which in the case of the Ophthalmic Journals of America, has been met by the amalgamation of a number of them into our new AMERICAN JOURNAL OF OPHTHALMOLOGY.

The conditions in 1904 were such that a number of medical editors and writers on ophthalmic subjects considered it wise at that time to start a journal which should be as nearly as possible a record of recent progress of ophthalmology, giving more full abstracts and more complete reviews than had hitherto been attempted, at the same time accepting for the department of original essays only those of distinct scientific value. At that time an arrangement was entered into with the *Ophthalmic Record* whereby the two journals would be published more or less under the same direction, an attempt being made to completely cover the whole field of ophthalmic literature.

The then new journal *Ophthalmology* restricted its printed matter to essays, abstracts and reviews, being published as a quarterly; while the *Record* took all the editorials and the news items in addition to essays. The first number appeared in October, 1904, with the following staff: H. V. Würdemann, managing editor and publisher; Nelson M. Black, assistant editor; Casey A. Wood, Chicago; Charles H. May, New York City; Charles H. Oliver, Philadelphia; Albert B. Hale, Chicago; Charles Zimmermann, Mil-

waukee; Wm. Zentmayer, Philadelphia; Blencowe E. Fryer, Kansas City; J. Guttmann, New York City; Frank Allport, Chicago; Edmond E. Blaauw, Buffalo; Mitsiyasu Inouye, Tokio; M. Wicherkiewicz, Cracow; and Claud Worth, London.

Changes were made from time to time, owing to the loss by death, removal to other countries, or by the exigencies of the work, until with the last issue the journal was published under the auspices of the following: H. V. Würdemann, managing editor and publisher; Charles H. May, New York City; A. A. Bradburne, Manchester; William R. Murray, Minneapolis; Melville Black, Denver; G. I. Hogue, Milwaukee; S. Z. Shope, Harrisburg; Fred Tooke, Montreal; E. P. Maynard, Calcutta; K. W. Majewski, Cracow; Edmund Jensen, Copenhagen; Casey A. Wood, Chicago; Charles Zimmermann, Milwaukee; L. Webster Fox, Philadelphia; S. Lewis Ziegler, Philadelphia; George W. Swift, Seattle; J. Franklin Chattin, Newark; John M. Wheeler, New York City; Harry S. Gradle, Chicago; Victor M. Lucchetti, San Francisco; Edmond E. Blaauw, Buffalo; J. Guttmann, New York; Marcel Danis, Brussels; Marc Landolt, Paris; Cirincione, Rome; M. Uribe y Troncoso, New York; Jose de J. Gonzalez, Leon, Mexico; Francisco M. Fernandez, Havana; Julius Fejer, Budapest; and S. Komoto, Tokio.

Of those whom we have lost by death may be mentioned Blencowe E. Fryer, Kansas City; George C. Harlan, Philadelphia; M. Wicherkerwicz, Cracow; Charles A. Oliver, Philadelphia; Mark W. Stevenson, Akron, Ohio; and Chas. H. Beard, Chicago, all of whom were active in writing for this journal. Of those connected with its editorial department upon its fusion with the AMERICAN JOURNAL OF OPHTHALMOLOGY, there will be found a number who were with us from its birth and we have noted with excess of pride that nearly all of our former editorial staff were chosen and have accepted positions on the new journal.

*Ophthalmology* lived under this name for thirteen years, and still exists; we hope will continue to live for many many

decades in the AMERICAN JOURNAL OF OPHTHALMOLOGY, now owned and published by and for the profession.

HARRY VANDERBILT WÜRDEMANN.

## THE OPHTHALMIC YEAR BOOK AND OPHTHALMIC LITERATURE.

The great amount of the ophthalmic literature of the world compared with the small part of it that was generally accessible to the American ophthalmologist, suggested the need of a new attempt in the field of review literature. The review departments of journals, and the ophthalmic part of medical year-books touched only a small part of the world's literature; and up to that time, the systematic arrangement of the material presented was greatly neglected.

The decision to publish a year book was reached in June, 1903, and the first volume appeared in May, 1904. By the latter date, two new journals, the *Ophthalmoscope* and *Ophthalmology*, had appeared. These both showed an advance on the older journals in the system of arranging their review departments, but left much to be desired as works of reference through which the student could get in touch with everything important that had been written with regard to any particular subject. To meet the need of a publication that should unite and organize the great scattered, unrelated mass of the literature of ophthalmology, the *Ophthalmic Year Book* was started.

The first volume, containing 250 pages, was prepared wholly by the writer. For the second and third volumes, George E. de Schweinitz helped; and for the fourth volume, the aid of Theodore B. Schneideman was secured. These colleagues not only worked to sustain and advance the standard of thoroughness and literary excellence set for the *Year Book*; they also shared equally in the cost of printing the volume after it was prepared.

In the preparation of these earlier volumes, much valuable assistance was given by the late Edmund W. Stevens, George F. Libby, Frederick A. Davis,

Edward A. Shumway, and F. Mayo Schneideman.

In volume eight, William Zentmayer took the place of Dr. de Schweinitz, and beginning with volume nine, Wm. H. Crisp actively participated in the work. For volume ten, Casey A. Wood, Wendell Reber, Harry S. Gradle, Robert Henry Elliot of London, H. Aufmwasser, and Meyer Wiener became collaborators; and since then Will Walter, Florence Mayo Schneideman, Nelson M. Black, Chas. Zimmermann, Thos. B. Holloway, D. Forest Harbridge, Chas. P. Small, Emory Hill, Wm. C. Finnoff, Marcus Feingold, and M. Uribe Troncoso have taken up the preparation of parts of the Digest of the Literature. All of these who are living have become collaborators in the AMERICAN JOURNAL OF OPHTHALMOLOGY.

With such added assistance, the literature of the world was more and more thoroughly searched, and the resulting volumes grew in size, until in 1914 the maximum was reached, 545 pages. Since the beginning of the world war, the amount of the current literature of ophthalmology has declined, and the size of the annual volume has slightly diminished.

For volume eight, the financial burden was assumed entirely by the Editor, but it continued heavy, although the price of the volume had been raised from two to five dollars. But for the subsequent volumes, the contributors to the Knapp Testimonial Fund, became in effect subscribers to the volume. The price was raised to ten dollars per year, and the increased income thus provided has been sufficient to pay for the printing and distribution of the volume, although never for all the cost of preparation.

In preparing the Digest of the Literature for the Year Book, care was always necessary to avoid duplication of matter; and as the number of collaborators increased, the difficulty of doing this became greater. This led to the working out of a plan to prepare from month to month a classified list of papers that had been published, through which each collaborator on the Year Book could be informed of the literature belonging to his special department. It was also seen that



such lists would be of high value to every student of the literature of ophthalmology; and when the plan had been thought out, it was laid before those most likely to be interested in it, and the support offered justified the publication of such lists in the form of a monthly journal of *Ophthalmic Literature*.

Applying the results of experience with the Year Book, the price of this journal was placed at five dollars per year from the start and from the first the subscriptions paid for the printing, while the preparation of the lists was but little more than had to be done for the Year Book. With this support, it was possible to afford the American Academy of Ophthalmology and Oto-Laryngology the opportunity of supplying its members with this journal at a very moderate price; and in this way, *Ophthalmic Literature* obtained a wide circulation for such a special journal. To the lists men-

tioned were added abstracts of articles, book notices, and editorial discussions of topics bearing on the literature of ophthalmology and proper training for ophthalmic practice; but the essential part of the journal was its index of current publications.

While the *Year Book* and *Ophthalmic Literature* cease their separate existence, everything of value about them will continue in the new AMERICAN JOURNAL OF OPHTHALMOLOGY. The Digest of Literature will be continued in the same form and prepared by the same writers, except as these have been drawn from this duty to take up the military service of a greater cause. The "Index" prepared under the same supervision will appear each month, covering the literature of the month preceding. The continuity of this literature is unbroken.

EDWARD JACKSON.

## BOOK NOTICES.

**MEDICAL OPHTHALMOLOGY,**  
Arnold Knapp, M. D., New York City, Professor of Ophthalmology, Columbia University, Executive Surgeon Herman Knapp Memorial Eye Hospital. A volume in an International System of Ophthalmic Practice, edited by Walter L. Pyle, M. D. 8vo, 525 pages, 32 illustrations. Philadelphia: P. Blakiston's Son and Company, 1918. Price \$4.00.

Not for years has the reviewer taken a greater interest nor has he gained more solid information from any text book dealing with Ophthalmology than he has from this new work.

The "Bandwurm periode" of Graefe-Saemisch-Hess, Lewandowsky, Henschen, Wilbrand and Snger, et al.; the snappy but yet brilliant reasonings of de Lapersonne et Cantonnet and the sometimes dry as dust "Transactions" have been translated into understandable American-English so that tho the work takes all of 480 pages, each subject, aye, even each sentence, is so succinct and yet so descriptive that the idea is irresistibly indented into the reader's cerebral cells.

"The Ophthalmologic relations, closer or remote, with every branch of medicine and surgery; indeed, with almost every branch of science," are well exploited therein. Of particular value to the advanced student and to the consultant are the explanations of the Author in the anatomic and physiologic chapters; almost every paragraph dealing with pathology points out the *raison d'être*. "And now remains—that we find out the cause of this effect, or rather say, the cause of this defect, for this effect defective comes by cause" (Hamlet). The Author has well correlated the general causes of ophthalmic disease as well as their relations as symptom complexes of general affections.

Indeed, the reviewer is so enthused over this book that he finds it difficult to deliver a satisfactory resumé within our limits, in other than glittering generalities or by a dry syllabus, which might be sufficiently descriptive to acquaint a prospective purchaser of its contents.

If for nothing but the clear descriptions of anatomy and diagnostic pathology, the book would be well worth

while; but it is likewise welcomed for the master touch and teaching of its Author, whose personal experience and reasoning is shown in almost every page.

The principal headings are Anatomy and Physiology, Disease of the Nervous System, Glands with Internal Secretion, Poisons, Infectious Diseases, Circulation, Respiratory and Digestive Tracts, Kidneys, Anemia, Diabetes, Female Generative Organs, Osseous System, Skin Diseases and Hereditary Affections.

The thirty-two illustrations are all diagrammatic, relating to the anatomy and physiology. It is a fitting companion to others of the series by Darier, Beard, Collins and Mayou, Holmes, Pyle and Lancaster. Well edited, printed and bound, it merits a place at the right hand of every well versed physician and surgeon.

H. V. W.

The division of medical practice into definite specialties renders necessary a new class of literature to bridge the gaps between the works that belong distinctively to one specialty or another. This borderline literature is required to unite the different branches of the medical science; and to broaden the grasp on their own work, of those who specialize in practice. The wide relations of eye lesions to general pathologic processes, and the importance of the eye in general medical diagnosis, as well as the peculiarly complete and general specialization of ophthalmic practice, render this kind of literature especially important with regard to ophthalmology and its relations to general medicine.

Some appreciation of the importance of this class of literature has been reflected in the numerous journal articles that have appeared of late years regarding the eye and general diseases. Many of the recent text books on ophthalmology have chapters devoted to this subject. There have been important monographs written on certain phases of it, like medical ophthalmoscopy, toxic amblyopias, the general effects of eye strain, or the ocular affections arising from diseases of the nose and nasal accessory sinus. But until this time, no book has been produced in the English language

covering the whole of this important subject.

Knapp's work, therefore, appears in an unoccupied field, where something of the kind was needed. Moreover, it is well written. The facts regarding each topic are selected with sound judgment as to their relative importance, and they are stated clearly and succinctly. There is an absence of "padding" throughout. The only thing about the work that might be regarded as extraneous to its subject is the part (80 pages) given over to introductory anatomy, but this part is greatly needed by most ophthalmologists. It deals not with the anatomy of the eyeball, but with the anatomy and physiology of that part of the nervous system concerned directly or secondarily with the act of vision. Following it come 116 pages devoted to Diseases of the Nervous System.

The main headings under which the subject matter is considered have already been mentioned in the preceding notice. These sections vary greatly in length. That on Infectious Diseases, including of course syphilis and tuberculosis, occupies over one hundred pages; that on the Osseous System, only four. The illustrations are all used in the first section on anatomy. They are diagrams that greatly assist in elucidating the subject.

As a piece of book printing and binding, Knapp's Medical Ophthalmology is well done. In style, it conforms to others of the same series. Paper and typography are good. It has a complete table of contents, and full indexes of authors cited and of subjects.

Every ophthalmologist in active practice needs this work. There is nothing to take its place. It will be equally valuable to those who do not treat eye diseases, but who wish to be ready to recognize eye lesions attending the diseases they do have to deal with. It should find a wide circle of readers, and add much to the ability of the medical profession to deal with the eye lesions that arise in connection with general or extraocular diseases.

Its wise selection of facts, clearness and condensation, make it preëminently a desirable book for the practitioner. For the student of literature, it is less



satisfactory. The reading on which it is based has not been broad enough to make it quite complete. Generally the best papers and monographs have been consulted, but their deficiencies have not always been made good by wider studies. The German monographs in the "Graefe-Saemische-Hess Handbuch" and Lewandowsky's "Handbuch der Neurologie" are amply represented (of 393 citations, 237 are from German works); and the work of Nettleship on Hereditary Diseases is fully recognized. But some other important sources of material, appropriate to this book, are not represented. Probably in this way have arisen certain omissions which should not appear in another edition, that will doubtless soon be called for. Blastomycosis is more important to the American practitioner than leprosy. Congenital word blindness will as often come to the ophthalmologist as the acquired form of alexia, and will be more likely to pass unrecognized. Miner's nystagmus is as worthy of mention here as the vestibular or hereditary form. The general effects of eyestrain have been extravagantly exploited, but it would be appropriate to give them a brief, carefully considered statement in such a work.

E. J.

**EYE HAZARDS IN INDUSTRIAL OCCUPATIONS.** Gordon L. Berry, Field Secretary, National Committee for the Prevention of Blindness, with the Co-operation of Lieut. Thomas P. Bradshaw, U. S. Army, formerly Technical Assistant to the Director of the American Museum of Safety. No. 12. 8vo. 145 pp. November, 1917. New York City. Price \$0.50.

This is largely a survey of the representative industries in the City of Buffalo made by the National Committee. Starting with this as a basis, an endeavor was made to cover practically the entire field of hazards to the eye in Industrial accidents in the United States, but I do not note therein the occupation of Ship Building, to which my attention has more recently been called by the enormous development of this industry in Seattle and the cities of Puget Sound. Likewise the lumber industry, which is of very great extent here, had not been particularly

touched upon. The former, however, has been well cared for by the Author in his citations regarding the steel and machinery trades. Both of these are subject to somewhat unusual and perhaps more gross injuries of the eye and head than those of some other workers, from the extent to which the workmen are subjected by reason of tumbling from heights, and the falling of more or less heavy objects from above.

Be this as it may, the pamphlet has well covered the subject. The Buffalo inquiry comprises 70 plants employing 35,000 workers. Stone, clay, glass products; brass, copper, aluminum; gold, silver, and precious stones; sheet iron works; hardware, castings, forgings, etc.; machinery; instruments and electric apparatus; carriages and automobiles; car and railway repair shops; paper and paper goods; pianos, organs and other musical instruments; boots and shoes; miscellaneous leather and canvas goods; rubber goods; buttons, paints, etc., chemicals, oils, paints, etc.; women's garments and furnishings; beverages; textiles.

Inspection of each shop was carried out and the care and efficiency of some protective devices which had been provided were studied. The attitude of employer and workmen and their opinions were obtained. Following inspection of each plant, a conference was held with the officials in charge and suggestions and criticisms were made for the betterment of the plant conditions.

During the year 1913 there were approximately 25,000 fatal accidents, 300,000 serious injuries and 2,000,000 other injuries to workmen in the United States. For the year 1916 there was a reduction of about 12.3 per cent in fatal industrial accidents frequency, and reduction of about 28 per cent of serious cases; and the same may be held for the year 1917 despite the great activity of the iron and steel trades.

The following statement reports eye accidents for the 12 months previous to June, 1917. There were 710,571 industrial accidents, of which 59,436 were to the eye, showing approximately 8.3 per cent. Another estimate gives the following:



1. Of the 2,000,000 annual nonfatal accidents, probably 200,000 are accidents to the eyes.

2. Approximately 15,000 persons in the United States are blind today as the result of accidental injury in industrial occupations.

3. The maintenance of these blinded artisans during the remainder of their lives will cost nearly ten million dollars, which expense will fall in large part on relatives, the community or state.

4. The actual economic loss cannot be estimated, and the loss to the unfortunate person whose eyesight is destroyed is least of all, a matter of dollars and cents. From these statements is it not apparent that one of the most important industrial problems of today is that of the protection of employes from accidents that will destroy or greatly impair vision?

The book goes on to describe the conditions under which accidents have been suffered and is replete with illustrations. It pays further attention to the safety movement which has resulted in reducing industrial accidents and in spite of temporary set-backs will be increasingly effective.

In conclusion, the objects of the National Committee for the Prevention of Blindness are stated. The objects are: 1. To endeavor to ascertain, thru study and investigation, any causes, whether direct or indirect, which may result in blindness or impaired vision. 2. To advocate measures which shall lead to the elimination of such causes. 3. To disseminate knowledge concerning all matters pertaining to the care and use of the eyes.

H. V. W.

**SAVING SIGHT AND CIVIC DUTY.** Winifred Hathaway, Secretary National and New York State Committees for the Prevention of Blindness. 8vo 61 pp. December, 1917. 130 E. 22nd St., New York City. Free on request.

This is a demonstration by the Public Health Department of Buffalo of how a typical city conserves the vision of its future citizens. Very few cases of ophthalmia neonatorum are found in Buffalo owing to the midwifery laws of 1885, the necessity for midwives to report puerperal sepsis, the use of Credé's

method, the calling of physicians by the midwives in difficult labor cases, report blanks, visiting nurses, the obligatory microscopic examinations, medical inspection of sore eyes, the prompt filing of birth certificates, through which by persistent application, excellent results have been obtained.

It has been found that in most cases this has been accomplished without legal authority and enforced penalties and it has been demonstrated that there is value in prophylaxis for Buffalo is getting results with the elimination of ophthalmia neonatorum and the prevention of blindness.

The book goes on to describe in detail the work of health centers which include a medical clinic for general treatment and free natal clinic and well baby clinic, those for sick babies and nose, eye and ear and skin clinic and a free dental clinic.

The work is freely illustrated and it shows that adequate provision of conserving the sight of children is concerned, every community, no matter what the size.

Adequate provision for the preventing, reporting and treatment of ophthalmia neonatorum, medical school inspection and nursing service for follow-up work and for the discovery and correction of any and all visual defects and eye diseases, give the best results; and these procedures should be emulated by the health departments and the legal authorities of all other cities. Copies of various health blanks and notifications and reports are appended.

H. V. W.

**MANUAL OF OPHTHALMOLOGY.** Prepared by the Section of Ophthalmology, Surgery of the Head, Office of the Surgeon General, War Department, Washington, with Appendix. 141 pages; 35 illustrations in the text. Government Printing Office, Washington, 1917.

The need of a small ophthalmic manual for the instruction and guidance of regimental and other surgeons of the National Guard and National Army, and for the use of those who attend courses on ophthalmology in the various camp and cantonment schools, has led to the publication of this work.

As stated in the preface, the manual is concerned only with the commoner diseases and injuries of the eye, and the simpler methods of diagnosis, including a short account of well known methods of detecting refractive errors and of measuring their amount.

A few operative procedures are described, but only those that may be regarded as emergency operations.

As is entirely appropriate in such a handbook, the most useful aspects of medico-military ophthalmology are considered. With this purpose in view, the Appendix furnishes the visual requirements for recruits and enlisted men and for applicants in the Aviation Section of the Signal Corps.

A practical account of visual malin-gering is also given, as well as a description of the most reliable methods of detecting ocular simulation.

A formulary, that includes the commoner remedies and agents used in ophthalmic practice, is also furnished. These prescriptions should be useful to the surgeons for whom the manual is intended. But we believe that as a rule the employment of astringents in eye diseases, —even the mild solutions of tannin, zinc, and copper sulphates formulated on pages 136 and 137—might with advantage to all concerned be left to more expert hands than those for whom this handbook was written. This contention seems all the more to the point since active trachoma (being a cause for discharge from the army), is no longer treated in regular military hospitals. Perhaps it would be a safe rule for the student to confine the use of zinc preparations to those cases in which the Morax-Axenfeld bacillus has actually been discovered in the discharges from the eye under observation.

The book is printed on good paper, it is well bound and, altogether, reflects credit on the group of ophthalmologists on the staff of the Surgeon General who are responsible for its appearance.

**TRANSACTIONS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.** Vol. 37, 421 pp., 31 illustrations, 7 plates. London: J. & A. Churchill, 1917.

This volume is something more than

scientific transactions kept up to a high standard. It is a monument of British pluck and perseverance, of determination to "do one's bit" under the most adverse circumstances. There is evidence of war conditions in the physical makeup of the volume, in the thinner, poorer paper and the smaller number of illustrations. But the names of German members of the Society, honorary or regular, hold their accustomed places in the lists; and there is no falling off in the number of pages or the high scientific standard these pages maintain.

There is evidence of a determination to use to the fullest extent such opportunities as war affords to add to our knowledge of the eye and the means of ameliorating the effects of its injuries. The leading discussion is upon concussion injuries of the visual apparatus. The next takes up the employment of the blind. A timely paper deals with the protection of the eyes in warfare, and another, the fundus lesions in war nephritis. Such papers and discussions give hints of the wealth of scientific observations being made by workers who cannot now prepare them for publication, or lay them before scientific societies.

The cast of mind which can pursue its worthy object in spite of this conflict precipitated by greed for world dominion will certainly triumph over barbarism, however ruthless and "efficient." The lesson of this volume is one of courage and steadfastness. It preserves admirably the general character of its predecessors. There is the same collection of interesting, important, well observed cases; while the more formal papers all have permanent value.

The Bowman Lecture in this volume is by Sir George A. Berry, on *Color Sense Phenomena and Some Inferences Which They Seem to Suggest*. It occupies 55 pages, and reveals a great deal of speculative thought upon the subject; but points out that we have no established theory of color blindness; only hypotheses more or less helpful in stimulating research, but apt to fetter judgment as to new facts on the part of those who fully accept them as demonstrated theories.

E. J.

## CORRESPONDENCE.

### OPHTHALMOLOGY IN PHILADELPHIA.

JOURNAL OF OPTHALMOLOGY: I regret exceedingly that I omitted from my "Historical Sketch of the Rise and Progress of Ophthalmology in Philadelphia" a sufficient notice of the work of Dr. Wm. E. Sweet on the "Localization of Foreign Bodies." The omission was due to the fact that I found it well-nigh impossible to contribute a complete bibliography of the meritorious contributions to ophthalmic science made by Philadelphians. But I had intended to include this work of Dr. Sweet because of its great importance, and I am therefore, asking that you will place this apologetic statement in your correspondence department of the JOURNAL.

I have been very much distressed in my mind by the numerous omissions in the little History. I sincerely trust that you are establishing a department in the JOURNAL for such brief and informal communications as this. With great respect, I am

Very sincerely yours,

SAML. D. RISLEY.

Philadelphia.

### PROPHYLAXIS OF OPHTHALMIA NEONATORUM.

JOURNAL OF OPTHALMOLOGY:

After complimenting you most heartily on the general appearance and contents of the new composite ophthalmologic journal, I desire to call your attention to an article written by Dr. Thomas Hall Shastid on "A Composite Ophthalmia Neonatorum Law." The general character of Dr. Shastid's Law is excellent; and were it not for the fact that I fear an expression by such an eminent authority as Dr. Shastid might lead others into error, I would make no comments upon his Composite Law. But it seems to me that Dr. Shastid has fallen into a grievous error when he alludes to the most important part of the Law, viz, the use of a prophylactic at birth. In the first paragraph of the article he lays down the dictum, in italics, that the most impor-

tant part of the whole procedure is the use of what he calls "the Credé drops" at birth. Nobody will dispute this statement, but in Section 2 of his Law he gives the physician the option of using one of three remedies:

The first is a 1 per cent solution of nitrat of silver.

The second is a strong solution of argyrol.

The third is a strong solution of protargol.

The first suggestion as to the use of nitrat of silver is unquestionably correct, and when a physician uses this solution in the proper manner, he is using the Credé treatment. But when he uses the substitutes—argyrol and protargol—he is not using the Credé treatment. So far as my reading is concerned, Credé has never even mentioned, in his writings, either argyrol or protargol. These are substitutes that have grown up in later years; and, in my opinion—and I believe in the opinion of most experienced ophthalmologists—neither of these remedies can be depended upon as a prophylactic in ophthalmia neonatorum. Argyrol is very weakly bactericidal. Protargol is more energetic in its action. But neither are sufficiently strong, in my opinion, to be regarded as a safe prophylactic in the eyes of newly born children. Sophol is highly regarded by some physicians, but up to the present time the reports from its use are not extensive and favorable enough to warrant its being used as a substitute for nitrat of silver.

At the present time nitrat of silver is far more dependable as a prophylactic than any of the substitutes that have been proposed. Why then, should a physician be given the option of using either nitrat of silver or other inferior drugs? If we are going to have a law on this subject, why not have one that is as nearly right as we can make it? When Dr. Shastid, or anyone else, proposes the use of argyrol or protargol as a substitute for nitrat of silver in the prevention of ophthalmia neonatorum, he is simply making suggestions that, in my



opinion, are not warranted by facts, and that will not be endorsed by most experienced ophthalmologists; and which, further than this, are unreliable and uncertain in their action. Let us then—until

we have something that is thoroughly dependable—adhere to nitrat of silver.

Very respectfully yours,

FRANK ALLPORT.

Chicago.

## NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. As these columns go to press on the 30th of the month contributors should send in their items by the 25th. The following gentlemen have consented to supply the News Item Editor with the news from their respective sections: Dr. James A. Black, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. A. E. Davis, New York City; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. H. Kress, Los Angeles; Dr. W. Holbrook Lowell, Boston; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. Geo. M. Waldeck, Detroit; Dr. Oscar Wilkinson, Washington. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered as well as all foreign countries. Volunteers are therefore needed and it is hoped that they will respond promptly to this call.

### DEATHS.

Barnard, Annie T., Southwark, England, of pneumonia.

Moore, Robert L., Columbia, S. C., January 24, 1918.

Tiffany, Flavel B., Kansas City, Mo., January 4, 1918, aged seventy-one.

Tull, Montrose G., Philadelphia, Pa., January 25, 1918.

### PERSONAL.

Dr. Clarence Loeb has removed his office to the Marshall Field Annex Building.

Dr. David V. Meikelsjohn has been appointed oculist for the Soo Line at Fond du Lac.

Dr. L. N. Grosvenor, formerly of Chicago, now practicing in Huron, South Dakota, has been elected Secretary-Treasurer of the Sioux Valley Eye and Ear Academy.

Dr. M. Uribe-Troncoso, formerly of Mexico City, has been made Secretary of the Spanish Medical Society, La Sociedad Medica Hispania-Americana, in New York City.

At the annual meeting of the Chicago Otolaryngological and Rhinological Society, Dr. Frank Allport was elected president, Dr. Charles H. Long, vice-president, and Edward P. Norcross, secretary.

Dr. James A. Spalding, of Portland, Me., for many years a contributor to the literature of ophthalmology, has been made President of the Maine Medical Association, and is also serving as Editor of the Maine Medical Association Journal.

### MILITARY NOTES.

Dr. J. L. McCool, of Portland, Oregon, has been placed in charge of the Aviation Examining Unit, with rank of Captain.

Captain William H. Huntington, of Washington, D. C., has been assigned to the Army Medical School as instructor in ophthalmology.

The eye, ear, nose and throat staff at Camp Wheeler is happy in the realization of its hopes of being installed in its new building.

Captain Edward E. Maxey, of Boise, Idaho, has been transferred for temporary duty to Camp Sherman, Chillicothe, Ohio, from Fort D. A. Russell, Wyoming.

Major P. J. H. Farrell, on duty at Camp Travis, Texas, who has been very ill with pneumonia, is reported to have successfully passed the crisis and is now on the way to recovery.

Our compatriot and confrere, Edmond Landolt, of Paris, whose two sons are ophthalmic surgeons, in correspondence with Dr. Würdemann, writes that his elder son, Ferdinand Landolt, Major 2nd Class, Reserve Medical Service 167th Regiment, Infantry, was wounded in the hip and forearm at Verdun, and is now undergoing recovery at the Champs Elysees Hospital. He has received the grade of Chevalier in the Order of the Legion of Honor on account of his great courage as Chief of the Medical Service, his remarkable professional ability and devotion to duty. He served in the front line and rendered great services, particularly during August and September of 1917. He was wounded severely on the 20th of October, 1917, in active performance of his duty. Two citations have been made. This last nomination carries with it the Croix de Guerre with the palm. Dr. E. Landolt's second son, Major Marc Landolt, is director of the Ophthalmic Hospital at Clermont.

### COMING MEETINGS.

Ophthalmological Society of the United Kingdom, London, May 2-4.

Section on Ophthalmology, American Medical Association, Chicago, June 11-14.

American Ophthalmological Society, Eastern Point, New London, Conn., July 9-10.

Oxford Ophthalmological Congress, Oxford, England, July 10-12.

American Academy Ophthalmology and Otolaryngology, Denver, Colo., August 6-7-8.

Pacific Coast Oto-Ophthalmological Society, Salt Lake City, Utah, August 12-13.

#### SOCIETY NOTES.

A mid-winter meeting of the Indiana eye, ear, nose and throat specialists was held in Indianapolis, March 6th and 7th.

At the meeting of the eye, ear, nose and throat section of the Indiana State Medical Society, held February 6th and 7th, there was organized the Indiana Society of Ophthalmology and Otolaryngology.

The Chicago Ophthalmological Society is to cooperate with the Chicago Laryngological and Otological Society in arranging special clinics once a month, on the two days on which these two societies hold their regular meetings.

The regular meeting of the Chicago Ophthalmological Society was held on February 18th. It was voted to have printed on the regular monthly programs the temporary addresses of those members of the society who are on active duty at the different camps.

At the next meeting of the Illinois State Medical Society, May 21st, 22nd, and 23rd, at Springfield, Ill., the Eye, Ear, Nose and Throat Section will hold a Clinic and Demonstration of Cases on Tuesday, the 21st, from 10. A. M. to 5 P. M. Dr. J. Sheldon Clark is Chairman of the Section.

The Annual Congress of the Ophthalmological Society of the United Kingdom will be held in London, May 2, 3, and 4, under the presidency of E. Treacher Collins, F. R. C. S. The session of the first day will be held at the rooms of the Royal Society of Medicine; on the second morning a visit will be made to the Metropolitan Asylum's Board Ophthalmia School, Swanley. In the afternoon a visit will be made to the museum of the Royal College of Surgeons, and the evening session will be held at the Royal Society of Medicine. The session of May 4th will be clinical, and will be held at the National Hospital for Paralysis, Queen's Square.

#### MISCELLANEOUS.

Under the auspices of the Pennsylvania Association for the Blind, a museum of all appliances for the prevention of blindness is being opened in Pittsburgh.

The Irish Local Government Board has appointed an Advisory Committee on matters relating to the care and supervision of the blind in Ireland. The Chairman is Sir Thomas Stafford, Bart., C. B.

Twenty-five thousand dollars for the establishment of a model eye hospital in Palestine, has been given by Mrs. Peter J. Schweitzer of Brooklyn, N. Y. The hospital will be under

the supervision of Dr. Joseph Krinsky, and be modeled on American lines.

From the records of the first draft, when more than two and a half million men from all parts of the United States were examined physically to determine their fitness for military service, it is reported that defective eyes caused nearly three times as many rejections as any other physical defect.

The Pennsylvania Association for the Blind has offered to the members of the senior class of the Medical School, University of Pittsburgh, a prize of \$100 for the best essay of two thousand words on the prevention of blindness. The committee on award consists of some of the best known oculists and laymen in western Pennsylvania. It is expected to make this offer annually to each senior class.

In carrying forward its work, the National Committee for the Prevention of Blindness has published pamphlets dealing with causes of preventable blindness; has made a loan collection of lantern slides of more than 500 titles; has served nearly every state in the Union and several foreign countries; and publishes five times a year the *News Letter*, sent free to all interested persons. E. M. Van Cleve, Managing Director, 130 East Twenty-second street, New York City.

Senator Owen and Representative Dyer introduced into the Senate and House respectively the following bill: "That hereafter the Commissioned officers of the Medical Corps and of the Medical Reserve Corps of the United States Army on active duty shall be distributed in the several grades in the same ratios heretofore established by law in the Medical Corps of the United States Navy." Medical men throughout the country should support these bills by writing their senators and representatives to vote for their passage.

Neglected supervision of the child by its parents before it enters school is the subject of sharp rebuke and admonition from Dr. Wilmer Krusen, Director of the Department of Public Health and Charities of Philadelphia. Dr. Krusen says: "The eyes, ears, teeth, nose and throat should receive special attention, as defects of these parts of the body are most frequent. Defective vision must be corrected if the child is expected to keep up with his studies and to maintain the same standard as the normal child."

An outstanding feature of the relief rendered after the Halifax disaster, the explosion of the munition ship *Mont Blanc* the morning of December 6, 1917, was the prompt and efficient surgical service rendered in saving sight. More than 1,000 cases of eye injuries were handled by the oculists of Halifax, Truro and other Canadian cities, and by the specialists from Boston, Providence and elsewhere who came to the assistance of the overwhelmed local physicians as soon as it was known that there was unexampled need for help. The result of this promptness and efficiency is saving of many from total blindness.

# OPHTHALMIC LITERATURE.

Under this head continuing the "Index of Ophthalmology" heretofore published in *Ophthalmic Literature* will be found the subjects of all published papers received during the last month, that bear to an important extent upon ophthalmology. The subject is indicated rather than the exact title given by the author. Where the original title has been in a foreign language it is translated into English. The journal in which the paper is published will indicate the language of the original.

The names of the different journals are indicated by abbreviations which generally correspond to those used by the *Index Medicus*, the *Journal of the American Medical Association*, and the *British Journal of Ophthalmology*. We will from time to time publish the list of ophthalmic journals, with the abbreviations used for each. Often a single letter discriminates between journals published in different languages. Thus "Arch. of Ophth." refers to the Archives of Ophthalmology, published in English; "Arch. d'Opht.," indicates the French Archives d'Ophthalmologie; "Arch. de Oftal." refers to the Archives de Oftalmologia Hispano-Americanos, while "Arch. di Ottal." indicates the Italian Archivio di Ottalmologia.

In this index of the literature the different subjects are grouped under appropriate heads; so that all papers bearing on the same, or closely related subjects, will be found in one group. The succession of the groups is the same from month to month, and identical with that of the Digest of the Literature. Where a paper clearly refers to two subjects that belong in different groups, it will be noticed in both groups.

Each reference begins with the name of the author in heavyface type. This is followed by the subject of his paper. Then in brackets a number with (ill.) indicates the number of illustrations, or a number with (pl.) the number of plates illustrating the article. (col. pl.) indicates colored plates. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that the paper was read before some society and gave rise to a discussion which is published with it.

It is desired to notice every paper as soon as possible after it is published. Readers will confer a favor by sending titles they notice have been omitted, with journal and page of publication; and of their own papers, sending either a copy of the journal in which each appeared, or a reprint. These should be sent as soon as possible to 318 Majestic Building, Denver, Colorado.

## DIAGNOSIS.

**Alperin, D.** The Ophthalmoscope an Aid in the Diagnosis of Obscure Systemic Diseases. *Eclec. Med. Jour.*, v. 78, p. 59.

**Parker, W. R.** Examination of Malingerers. *Med. War Manual*, No. 3. Philadelphia, Lea and Febiger.

## THERAPEUTICS.

**MacWhinnie, A. M.** Subconjunctival Injections (4 ill.). *New York Med. Jour.*, v. 108, p. 343.

**Metz, R. B.** Effect upon Eye of Tincture of Iodin. *Cleveland Med. Jour.*, v. 17, p. 18.

## OPERATIONS.

**Maddox, E. E.** Close vs. Distant Illumination for Operation. *Brit. Jour. Ophth.*, v. 2, p. 84.

## REFRACTION.

**Clarke, E.** Value of Ophthalmometer in Estimating Refraction of Eye. *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 343.

**Cridland, B.** Correction of Errors of Refraction. *Birmingham Med. Rev.*, 1917, p. 45.

**Edridge-Green, F. W.** Cause and Prevention of Myopia (1 ill.). *Lancet*, Jan. 26, p. 137.

**Kiehle, F. A.** Transitory Hyperopia in Diabetes. *Ann. of Ophth.*, v. 26, p. 564.

## OCULAR MOVEMENTS.

**Cantonnet, A.** Hole in Hand Test for Binocular Vision. *Presse Méd.*, Paris, v. 25, p. 686. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 422. *New York Med. Jour.*, v. 108, p. 379.

**Graef, C.** Vertigo—Nystagmus. *New York Med. Jour.*, v. 108, p. 241.

**Hoeve, J. van der.** Latent Nystagmus. *Ann. d'Ocul.*, v. 154, p. 738.

**Landolt, M.** Binocular Vision (6 ill.). *Arch. d'Opht.*, v. 35, p. 720.

**Sautter, A. C.** Ocular Palsies in Infantile Paralysis. *Ann. of Ophth.*, v. 26, p. 541.

**Worth, C.** Advancement Operations. *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 365.

## CONJUNCTIVA.

**Broyles, C. J.** Inflammation of Conjunctiva Resembling Trachoma. *Ann. of Ophth.*, v. 26, p. 560.

**Crawford, J. P.** Bulgarian Bacillus Culture in Treatment of Trachoma. *Ann. of Ophth.*, v. 26, p. 557.



**Derby, G. S.** Collective Treatment of Ophthalmia Neonatorum. *Brit. Jour. Ophth.*, v. 2, p. 121.

**Gibson, W. S.** Etiology of Phlyctenular Conjunctivitis. *Amer. Jour. Dis. Children*, v. 15, p. 81.

**Giuseppe, J.** Trachoma in Italy. *Gazz. degli Ospedali e delle Cliniche*, Milan, v. 38, pp. 578, 1316.

**Montaño, E. F.** Gonorrheal Ophthalmia. *Gaceta de la Acad. de Med.*, v. 11, p. 1. *Abst. Jour. Med. Assn.*, v. 70, p. 352.

**Perez Jimenez.** Acute Catarrhal Conjunctivitis Due to Koch-Weeks Bacillus. *Arch. de Oftal. Hispano-Amer.*, v. 17, p. 302. *Abst. Ann. of Ophth.*, v. 26, p. 641.

**Schweinitz, G. de.** Trachoma and Common Forms of Conjunctivitis. *Med. War Manual*, No. 3. Philadelphia: Lea and Febiger.

#### CORNEA AND SCLERA.

**Carreras, B.** Ethylhydrocuprein in Treatment of Corneal Ulcers. *Boletín del Colegio de Medicos de Gerona*, Feb. and March, 1917. *Espana Oft.*, Nov., 1917, p. 18.

**Daniels, C. W.** Trypanosome Keratitis. *Brit. Jour. Ophth.*, v. 2, p. 83.

**Lloyd, I.** Cocain Keratitis. *Ann. of Ophth.*, v. 26, p. 568.

**Tyrrell, F. A. C.** Mooren's Ulcer Treated with Conjunctival Flap. *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 205.

#### ANTERIOR CHAMBER AND PUPIL.

**Lamb, H. D.** The Pupil from the Ophthalmologist's Standpoint. *Jour. Missouri State Med. Assn.*, v. 15, p. 52.

**Tuckett, I. L.** Siderosis Affecting Innervation of Pupil. *Brit. Jour. Ophth.*, v. 2, p. 79.

#### UVEAL TRACT.

**Collins, E. T.** Subchoroidal Hemorrhage from Concussion, Relation to Commotio Retinae; Holes at Macula; Pigmentation of Retina; Pigmentary Disturbance of Macula (1 col. pl.). *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 112.

**Demaria, E. B.** Double and Serous Iridocyclorhoiditis Associated with Vitiligo. *Arch. de Oft.*, *Hisp.-Amer.*, v. 17, p. 355. *Ann. of Ophth.*, v. 26, p. 641.

**Harry, P. A.** Treatment of Cyclitis. *Prescriber*, v. 11, p. 179.

**Hudson, A. C.** Unilateral Melanosis of Iris Segment with Pigment Areas of Lid Margin and Pigmented Nevi in Skin of Face in Dark Complexioned Subject. *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 174.

**Loeb, C.** Hereditary Coloboma of Iris (1 ill., *Bibl.*). *Ann. of Ophth.*, v. 26, p. 573.

**Maxwell, E. M. and Kiep, W. H.** Iritis and Cyclitis in Dysenteric Patients (2 charts). *Brit. Jour. Ophth.*, v. 2, p. 71.

**Mayou, M. S.** Colloid Nodules in Choroid. *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 227.

**Herpes Zoster Affecting Ciliary Nerve (Iridocyclitis).** *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 226.

**Osborne, E. S.** Relation of Focal Infection to Ocular Disease. *Jour. Med. Assn. Georgia*, v. 7, p. 197.

**Prélat.** Bilateral Iridocyclitis with Antityphoid Vaccination. *Arch. d'Ophth.*, v. 35, p. 742.

**Westfall, L. M.** Iridocyclitis due to Focal Infection from Tooth. *Jour. Oklahoma State Med. Assn.*, v. 11, p. 61.

#### SYMPATHETIC OPHTHALMIA.

**Morax, V.** Clinical Statistics on Sympathetic Ophthalmia in the Army. *Ann. d'Ocul.*, v. 154, p. 705.

**Poulard, A.** Sympathetic Ophthalmia. *Ann. d'Ocul.*, v. 154, p. 702.

**Traumatic Sympathetic Ophthalmia.** *Ann. d'Ocul.*, v. 154, p. 697.

#### GLAUCOMA.

**Cilleruelo.** Antiglaucomatous Iridosclerectomy. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 268. *Abst. Ann. of Ophth.*, v. 26, p. 638.

**Feingold, M.** Late Infection after Elliot Operation not Always Fatal. *South. Med. Jour.*, v. 11, p. 150.

**Grimsdale, H.** Congenital Buphthalmos with Enlargement of Retinal Arteries. *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 175.

**Odeneal, T. H.** Elliot Trephine Operation and Iridotomy on Same Patient for Glaucoma. *Ann. of Ophth.*, v. 26, p. 601.

#### CRYSTALLINE LENS.

**Barraquer, I.** Ideal Extraction of Cataract. *Arch. de Oft. Hisp.-Amer.*, v. 17, pp. 252, 274. *Abst. Ann. of Ophth.*, v. 26, p. 639.

**Elliot, R. H.** History of Couching for Cataract (5 ill. *Bibl.*). *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 264.

**Taylor, S. J.** Dilation of Pupil in Cataract Extraction. *Brit. Jour. Ophth.*, v. 2, p. 119.

**Thomson, E.** Atropin in Cataract Extraction. *Brit. Jour. Ophth.*, v. 2, p. 117.

#### VITREOUS.

**Peck, W. H.** Treatment of Vitreous Opacities. *Ann. of Ophth.*, v. 26, p. 580.

#### RETINA.

**Collins, E. T.** Subchoroidal Hemorrhage from Concussion, Relation to Commotio Retinae; Holes at Macula; Pigmentation of Retina; Pigmentary Disturbance of Macula (1 col. pl.). *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 112.

**Gunn's Dots.** *Brit. Jour. Ophth.*, v. 2, p. 8.

**Kirk, J.** Eye Changes in Trench Nephritis. *Brit. Med. Jour.*, Jan. 5, p. 7; *Jour. Amer. Med. Assn.*, v. 70, p. 490; *Med. Rec.*, Feb. 16, p. 287.

**Alcho, M.** Congenital Vascular Anomalies of Ocular Fundus. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 229. *Ann. of Ophth.*, v. 26, p. 638.

**Schevensteen, J.** Retino-choroidal Complications with Spirochetosis Ictero-hemorrhagica. *Ann. d'Ocul.*, v. 154, p. 728.

**Tyrrell, F. A. C.** Symmetrical Pigmented Changes at Macula. *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 237.

#### OPTIC NERVE.

**Buchanan, L.** Opaque Nerve Fibres. (4 ill.). *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 166.

**Collins, E. T.** Small Tortuous Veins on Optic Disc with Small Vascular Nevi of Skin of Eyelid and Nasal Septum. (1 ill.). *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 171.

**Esposito, L. D.** Tabetic Blindness. *Cronica Med.*, v. 34, p. 402; *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 351.

**Fisher, J. H.** Leber's Disease with Changes in Sella Turcica. (2 ill.). *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 251.

**Marin Amat, M.** Right Facial Paralysis and Left Optic Atrophy from Trauma. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 375; *Ann. of Ophth.*, v. 26, p. 642.

**Pollock, W. B. I.** Leber's Disease with X-ray Examination of Sella Turcica. *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 247.

#### VISUAL TRACTS AND CENTERS.

**Congenital Word Blindness.** (Editorial.) *Med. Rec.*, v. 93, p. 157.

**Conkey, C. D.** Ocular Symptoms of Brain Tumor. *Jour.-Lancet*, v. 38, p. 70.

**Ginestous, E.** Lateral Homonymous Hemianopsia. *Rev. Internat. de Méd. et de Chir.*, Paris, 1917, v. 28, p. 53.

**Peterson, J.** Striking Illusions of Movement of Single Light on Mountains. *Amer. Jour. Psychol.*, v. 28, p. 476.

#### COLOR VISION.

**Berry, G. A.** Color-Sense Phenomena and Inferences Therefrom (7 ill.). *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 5.

#### LIDS.

**Tuckett, I. L.** Functional Blepharospasm with Temporary Loss of Sight. *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 188.

#### ORBIT.

**Caillaud, M.** Traumatic Bilateral Pulsating Exophthalmos (1 ill.). *Arch. d'Opht.*, v. 35, p. 746.

**Kalt, M.** Orbital Exostosis in Young Subject (2 ill.). *Ann. d'Ocul.*, v. 154, p. 723.

**Mayou, M. S.** Orbital Suppuration (8 ill.). *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 191.

**Pulsating Exophthalmos Following Head Wound (Dis.).** *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 186.

**Terson, A.** Orbital Inflammation in Infant. *Arch. d'Opht.*, v. 35, p. 739.

#### PARASITES.

**Navarrete and Mas.** Myiasis of Conjunctiva. *Arch. de Oftal. Hisp.-Amer.*, v. 17, p. 273. *Ann. of Ophth.*, v. 26, p. 637.

#### TUMORS.

**Hepburn, M. L.** Papilloma of Conjunctiva (1 col. pl.). *Trans. Ophth. Soc. United Kingdom*, v. 37, p. 190.

**Marin, M.** Angioma of Conjunctiva of Traumatic Origin. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 325; *Abst. Ann. of Ophth.*, v. 26, p. 639.

**Opin.** Benign Tumor of Choroid (3 ill.). *Ann. d'Ocul.*, v. 154, p. 724.

#### INJURIES.

**Cantonnet, A.** Eyelashes Driven Into Anterior Chamber. *Progrès Méd.*, Nov. 17, 1917, v. 32, p. 398; *Abst. Lancet*, Jan. 19, p. 110.

**Duverger.** Resection of Anterior Segment of Globe in Injury. *Arch. d'Opht.*, v. 35, p. 705.

**Giuseppe, T.** Hereditary Ocular Lesions. *Gazz. d. Osp. Milan*, v. 38, p. 577.

#### GENERAL DISEASES.

**Abadie, C.** Long Continued Mercurial Treatment in Ocular Syphilis. *Ann. d'Ocul.*, v. 154, p. 734.

**Craft, M. T.** Eye Conditions in Acromegaly. *Neurol. Bull.*, v. 1, p. 32.

**Frias Ornate.** Ocular Disturbances in Diseases of Nose. *España Oft.*, Nov., 1917, p. 15.

**Ginestous, E.** Eye Lesions After Typhoid Fever. *Progrès Méd.*, v. 32, p. 449; *Jour. Amer. Med. Assn.*, v. 70, p. 578.

**Leoz, G.** Ocular Sporotrichosis. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 293.

**Martinez.** Amaurosis the First Sign of Uremia. *España Oft.*, Nov., 1917, p. 16.

**Moret.** Ocular Troubles with Spirochetosis Ictero-hemorrhagica. *Arch. Méd. Belges*, Dec., 1917, p. 1105.

**Pierson, P. H.** Tuberculosis of Eye. *California State Jour. Med.*, v. 15, p. 74.

**Posey, W. C.** Syphilis of Eye. *New York State Jour. Med.*, v. 18, p. 48.

**Poulard, A.** Ocular Syphilis. *Presse Méd.*, Nov. 15, 1917; *Abst. New York Med. Jour.*, v. 108, p. 278.

**Zarzycki, P.** Eye and Ear Complications in Meningitis. *Bull. de l'Acad. de Méd.*, Paris, v. 78, p. 748; *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 492.

#### COMPARATIVE OPHTHALMOLOGY.

**Swindle, P. F.** Biological Significance of Eye Appendages of Organisms. *Amer. Jour. Psychol.*, v. 28, p. 486.

## HYGIENE.

**Irvin, R. B.** Classes for Conservation of Vision in City Public Schools. Ohio State Med. Jour., v. 14, p. 81.

**Smith, S. F.** Eye, Ear, Nose and Throat and Conservation of Health of School Children. Jour. Florida Med. Assn., v. 4, p. 69.

## OPHTHALMIC SOCIOLOGY AND HISTORY.

American Journal of Ophthalmology. Jour. Amer. Med. Assn., v. 70, p. 392.

**Crisp, W. H.** History of Operation for Cataract. Ann. of Ophth., v. 26, p. 585.

Eye Examinations in Selective Service for Army. Jour. Amer. Med. Assn., v. 70, p. 318.

**Freeman, L.** Operative Surgery of Western Hemisphere (Ill.). Jour. Amer. Med. Assn., v. 70, p. 443.

**Galloway, A. R.** Visual Standards for British Army. Brit. Jour. Ophth., v. 2, p. 120.

**Greenwood, A.** Military Ophthalmic Surgery. Med. War Manual, No. 3, Philadelphia: Lea and Febiger.

**Henderson, C. G.** Blindness in India. Med. Press, Jan. 9, 1918, p. 23.

Optometry Law in Illinois. Jour. Amer. Med. Assn., v. 70, p. 483.

**Pearson, A.** Employment of Blind. Trans. Ophth. Soc. United Kingdom, v. 37, p. 133.

Saving Sight a Civic Duty. Natl. Comm. for Prevention of Blindness. No. 13. New York City.

**Shastid, T. H.** History of Ophthalmology. Amer. Encyclo. and Dict. of Ophth., v. 11, p. 8525.

**Story, J. B.** Sir William Robert Wills Wilde. Brit. Jour. Ophth., v. 2, p. 65.

**Uribe-Troncoso, M.** Ophthalmology in the Medical Course. Gaceta Med. de Mexico, v. 11, p. 123. Abst. Jour. Amer. Med. Assn., v. 70, p. 424.



# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 1

APRIL, 1918

No. 4

## AN EXPERIENCE THROUGH THE HALIFAX DISASTER.

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MONTREAL, CANADA.

This paper, partly outside the usual lines of ophthalmic literature, gives the general aspects of a unique ocular catastrophe as seen by a colleague. It also gives the broad impressions gathered from a large number of cases, and about the effects of certain lines of treatment for such injuries.

The recent catastrophe at Halifax has apparently come and gone. Passed, perhaps to many at a distance whose near point is always fixed in relation to their preoccupation with the affairs of the moment and within their own very limited range of vision; an event never to be forgotten in Life's experience on the part of those whose fortune drew them to the help of that unhappy city.

Call the event an accident, a blunder, the part of an organized plan, define it as you will, it must still remain a tragedy of the war and be particularly considered as such as any event that has happened in France or in Flanders. Far be it from me to dare to assume the role of an arm chair critic at such a distance regarding what is happening overseas. I have, however, seen Halifax and I do happen to know what has happened there. A well known officer of one of Canada's most brilliant battalions, enjoying the distinction of a Master of Arts degree as well as a Distinguished Service Order decoration with bar, a scholar no less than a soldier, told me on driving me home to my billets one night after work, "the war has nothing on this, and I have seen the worst of it."

Be it an act of war in our own country, or approach it from any angle that may suit your own personal idea or opinion, however ridiculous or however improbable, I wish to state at the out-

set that I am glad that I was there. More than that, I would acknowledge with deep gratitude the privilege and the unusual opportunity accorded me, probably that of a lifetime, of helping suffering humanity; an occasion which might equally well have fallen to another and a duty that might have been fulfilled by another with more brilliant results if not by greater zeal and honesty of purpose.

The occasion could not have been staged with greater tragedy: the horror of its results could not possibly have appealed to anything other than what we are pleased to term our better selves. The whole affair was in many respects a revelation with respect to our regard for human nature.

A record of the events of any human experience, however satisfactory or however satisfying, is seldom published without being weighed down by an if or a but. Our recent adventure is no exception to such a general rule. My only regret is that our call for help from Halifax was not made more immediate and that we could not have arrived on the scene twelve or eighteen hours earlier. It would appear that the delay was unavoidable for very obvious reasons.

On December 8th, I was ordered by Lt. Col. Patch, A. D. M. S., Military District No. 4, to proceed at once to Halifax and report for duty to Lt. Col.

F. McKelvey Bell, A. D. M. S., Military District No. 6. My only instructions were that with the recent explosion an unusual number of eye casualties had occurred and that an eye surgeon was urgently needed. I left by the first train available, taking a complete set of eye instruments. Thru the courtesy and thoughtfulness of the authorities of the Royal Victoria Hospital who had heard of the order, Miss Etter of the nursing staff of the Ross Pavilion was detailed to accompany me for special duty. The trip to Halifax was uneventful but for its discomfort. We started out in a blizzard; much delay was experienced the first night driving against snow drifts. The following morning when connecting with the commissariat department at about ten o'clock, five hours late, we were put on very much reduced rations. Only two rather meagre meals were served by the dining car. Later on as the day grew dark, the electric light installation went out of order, a dim and almost inconspicuous light flaring up brightly only every few revolutions of the wheels. As we were dependent upon two candles during the intervening space of time the effect on the eyes was the same as frequently testing pupillary reaction and the result was headache. Our delay of six hours was in many ways an unmixed blessing for we were able to get a second rather comfortable night on the train rather than the anticipation of looking up billets in the early hours of the morning in a strange and devastated city.

We arrived at our destination on Monday morning at half past six o'clock. The day was dark and cold and the details of the city could scarcely be made out. The roof of the Canadian Government Railway Station had fallen in, innumerable cars and trucks were wrecked on the sidings, and we were compelled to make our way through a sea of broken glass and over countless obstacles, chiefly wreckage and coffins. One could not begin to count the latter. The sense of depression was almost unbearable. Not a sound could be heard, railway trains were not running, ours had only been

the second to arrive in Halifax, electric cars had been suspended, one could not even hear a motor horn. The streets seemed to be empty. The silence was intolerable and Halifax at first impression seemed to be in fact a city of the dead. We reported to Military Headquarters when I was assigned for duty at Camp Hill Military Hospital, taking Miss Etter with me.

A word of digression, however, regarding the source of the accident, its nature, and some of its effects. Probably a great deal of what I relate to you has already been furnished by the public press. Much detail might be supplied by many regarding the problematic nature of the explosion which I discreetly feel it better to avoid. In brief, the ammunition ship "Mont Blanc," laden with tri-nitro-toluol in the hold and with benzol in tanks on the deck, was rammed by the Belgian Relief steamer "Imo." With the collision the benzol ignited, and the "Mont Blanc" was soon ablaze. A call was rung in for the Halifax Fire Department. The peculiar glare from the light as well as the ringing of the fire alarms attracted everybody to the windows, principally women and children. An attempt was made to scuttle the burning ship but without avail. In less than half an hour's time a terrific explosion occurred as the result of the benzol and the tri-nitro-toluol coming together. One must visit Halifax and view its ghastly scars in order to estimate the awful result. An area one and a half miles square was laid flat, not a dwelling left intact, large trees were shattered. There was not one building in the whole of Halifax without broken glass. The home of the late Lt. Governor McKeen where I had the good fortune to be billeted, three and a half miles from the source of the accident, had more broken windows than one could count. A fortunate circumstance in many cases, as in this, was that the double windows had not been put up for the winter.

A few curious freaks showing the frightful force of the explosion. The anchor of the "Mont Blanc," weighing six tons, was discovered in one of the

dismantled Exhibition buildings three miles away. The ship's 4.3 gun was found a mile away over on the Dartmouth side. Many bodies were found with their clothing literally torn off them without their necessarily having been burned; while one man was carried through the air for a distance of a quarter of a mile and landed on terra firma, his only misfortune apparently being that a keg of nails had been predestined for his point of alighting. Verily the days of "Munchausen" are still with us. This statement, however, I can vouch for as the man gave evidence before the Naval Court of Enquiry the day before I left Halifax.

But to return to my special mission and my own experiences. I reported to Major Morris, Officer Commanding Camp Hill Hospital, the largest unit in action during the emergency. Camp Hill is a hospital designed, equipped, and intended in Halifax as others are contemplated in other divisions, for returned men who have been invalided home. The estimated capacity of Camp Hill was 280 beds, plus the sun parlors. By a fortunate coincidence there was a complete complement of medical officers, staff, and orderlies. Captain John Fraser, A. M. C., was also in Halifax with 200 reinforcements for the Army Medical Corps waiting for transportation overseas. Owing to Camp Hill hardly having been in action there were only five nursing sisters on duty, two for relief work and one for night duty. After the crash came, Camp Hill accommodated 1,630 patients. Let it be said to the everlasting credit of the V. A. D.'s that they nobly filled the breach. Also to that of Colonel McKelvey Bell, A. D. M. S., Military District No. 6, for the perfection and thoroughness of his organization. It was wonderful how quickly it was brought into action for such a crisis, and how thoroughly and with what detail the work was carried on. I never saw a large body of men and women work so harmoniously together. Besides the regular workers associated with the A. M. C., there were all sorts of helpers enlisted from all classes of society, making beds, scrubbing the wards, carrying food,

feeding the helpless, caring for the children, washing dishes and helping in a hundred and one different ways. Mistress rubbed shoulder with maid and charwoman, all imbued with the same desire to help. All the motors were commandeered and women frequently served as transport officers. Altho at the dawn of a Christmas season one could shudder with the thought of "Peace on Earth," one was inspired and encouraged with the doctrine of "Goodwill Towards Men."

Many of the wounded died the day they were admitted to hospital for this reason. After the explosion it was quite impossible to prevent terror and panic on the part of the mob and the rumor spread that the fire was making headway towards the arsenal at Wellington Barracks. A still more serious explosion was anticipated, and the poor people fled to the parks, woods and open places, away from the center of the city, scantily clad, with their ghastly wounds unattended. Here they were overtaken by a terrible blizzard and rescued by stretcher bearers in a half frozen and almost exsanguinated condition. The mortality was in consequence at first terribly high, largely the result of exposure, exhaustion and loss of blood, a circumstance for which nobody could be held directly responsible.

Every available bit of space at Camp Hill was taken up. Men, women, and children were at first all collected in the same ward irrespective of their condition. Frequently three would occupy the same bed. Patients were even under the beds and between the beds lying on blankets, as well as in the corridors. One made one's way thru the wards with the greatest difficulty. The day of my arrival the numbers were reduced to 900 and I would pay this tribute to Major Morris by saying that the hospital was carrying on in excellent order. The windows had all been repaired, each patient had a bed or mattress with warm clothing, while an abundance of good, nourishing food was served alike to patients and staff.

I was taken to a small back room lighted by a single electric globe. Here



a man was operating who was introduced to me as Doctor Cox of New Glasgow, N. S. I pay my tribute to this small town specialist, as well as to Doctor Putnam of Yarmouth, N. S., who later came to my assistance. The first mentioned bore the brunt of the first shock of the service. He left his work at home at a moment's notice and traveled one hundred miles to Halifax. He was left four miles out of the city groping about in darkness, frequently stumbling over dead bodies, before he was able to reach the center of the city. He at once put in a twenty-four hour continuous service and after a three hour rest had started again when I discovered him. Most of the night he had been working in the kitchen and operating on the floor. Doctor Cox from his appearance might have been anywhere from 40 to 65 years of age, such was the result of fatigue in his expression and behavior. He was manifestly exhausted and he told me that he had done so much work that his instruments would no longer cut. I sent him off to bed and proceeded to take over the service and sort out the material. There were about 120 people in one ward, practically all major operation cases. For this service I had two other oculists associated with me besides Doctor Cox to whom I have already referred. Doctor Cox left for his home the day after my arrival, one member of the staff developed a severe gastric disturbance due to overwork, while the third acquired a paronychia.

Left practically alone I consequently proceeded to form a "Union Government." Doctor Ames a general practitioner of Westville, Me., acted as surgical dresser; Mr. Haslam, a fifth-year medical student, gave more chloroform and gave it better than I have ever seen it given before. Sergt. Wallace, a returned Army Service Corps man, whose like I have yet to find for honesty, energy and ability, acted as my orderly, while Miss Etter and I completed the team. From this time on operations were undertaken somewhat more cautiously, due to the fact that the most urgent had already been performed.

Let us make a very brief survey of some of the cases in one ward under my care. Anything like complete note taking was quite out of the question. We were working under such pressure that it was impossible to dilate on a very few sketchy notes, without feeling that the more important fact of treating the patients was being overlooked. Sergeant Wallace, who was always at my heel with pad and pencil, managed to collect these few facts for me which afford one a fair average of the hundreds of such cases in the Hospitals of Halifax.

1. W. A. G. Right eye uninjured. Left eye, two long perforated wounds of the cornea, iris prolapsed. Iridectomy and edges of iris freed.

2. Unknown child. Wound of lid with marked induration of tissues. Examination under chloroform, eye uninjured.

3. Mrs. M. A. Both eyes and appendages torn to shreds. Remains enucleated, double dressing to orbits, multiple glass wounds of face and neck.

4. M. C. Child about 3 years. Laceration of left upper lid. Left eye completely destroyed. Lid sutured and remains of eye enucleated.

5. G. A. M. Laceration of lids of right eye, globe normal. Left eye perforated wounds of cornea. Iridectomy and lids sutured. Glass wounds in neck.

6. J. K. Left eye completely collapsed, enucleated. Right eye perforated wounds of the cornea, prolapsed iris, iridectomy.

7. Mrs. R. B. Multiple wounds of left cornea below at temporal side near ciliary margin. Presenting iris excised and flap of conjunctiva sutured over wound.

8. R. F. Multiple glass wounds of both lids. Dressed.

9. J. C. Abrasions of both corneae. Dressed.

10. J. B. Complete destruction of both eyeballs, large fragments of glass removed from globes after enucleation.

11. Mrs. G. R. Multiple incisions of both lids. Dressed.

12. G. B. Right eye normal. Perforated wound of left sclera up and out. Sutured conjunctiva over wound and applied double dressing for a few days.

13. R. S. Right eye normal. Perforated wound of left cornea. Iridectomy, argyrol, atropin and bandage.

14. G. H. Slight abrasions of right cornea. Condition not serious.

15. A. L. Right eye normal, left eye collapsed, enucleated remains.

16. Mrs. T. A. E. Superficial abrasions of right cornea. Perforated wound of left sclera with prolapse of ciliary body. Excised prolapse and sutured conjunctiva over wound. Atropin, argyrol and double bandage. To be treated conservatively pro tem.

17. Mrs. D. McK. Left eye abrasions of cornea. Perforated wound of right cornea with prolapse of iris. Iridectomy, atropin, argyrol and bandage.

18. F. McK. Left eye normal. Perforated wound of right cornea. Prolapse of iris. Iridectomy, atropin, argyrol and bandage.

19. Mrs. A. D. Left eye normal. Long perforating wound of cornea extending into sclera and ciliary body. Two other perforating wounds of sclera. Eye enucleated.

20. E. B. Right eye normal. Multiple wounds of cornea. Anterior chamber completely filled with blood. Treat conservatively for a few days.

21. W. H. Left eye normal. Perforating wound of right cornea with prolapse of iris. Iridectomy, atropin and bandage.

22. Mrs. G. A. M. Left eye normal. Right eye completely destroyed. Enucleated remains of right eye and sutured lid.

23. Mrs. A. B. Right eye normal. Half inch perforation of left sclera from corneal margin backward, globe collapsed. Enucleated.

24. Mrs. S. R. Right eye completely destroyed; enucleated; large corneal wound of left eye extending into ciliary body above. Conjunctival flap atropin, argyrol and bandage.

25. A. S. Right eye normal. Extensive perforating wound of left cor-

nea with prolapse of iris. Iridectomy, atropin, argyrol and bandage.

26. Mrs. C. S. Right eye normal, left eye completely destroyed. Enucleated remains.

27. T. N. Left eye normal. Oblique wound of left sclera over ciliary body, ciliary body and vitreous presenting. Enucleated.

28. M. B. V-shaped ragged wound of left cornea extending into the conjunctiva below. No apparent inclusion of iris or ciliary body. Atropin and bandage both eyes.

29. J. McM. Left eye normal. Perforating wound of left cornea at limbus. Iris incarcerated. Iridectomy. Soft lens matter to be evacuated later. Double bandage.

30. A. S. Right eye normal. Perforated wound of left cornea at limbus. Iris incarcerated. Iridectomy. Soft lens matter to be evacuated later.

31. F. S. Extensive necrotic wounds of lids and right side of face. Neither eye injured. Moist dressings to lids and face.

32. Mrs. P. Wound of right cornea extending 2mm. inward to nasal side towards ciliary body. Iridectomy, atropin, and double bandage.

33. Mrs. H. McN. Wound of right cornea at limbus. Iridectomy. Edges freed, atropin and bandage.

34. Mrs. S. R. Perforating wound of left cornea with prolapse of iris. Iridectomy. Right eye has already been enucleated.

35. F. B. Perforating wound of right cornea from limbus to center of pupillary area. Iris incarcerated and fixed about pupil. Iris freed and iridectomy done.

36. Mrs. A. S. Ragged tear of right cornea above in vertical line. Inclusion of ciliary body and vitreous in wound. Treat conservatively. Perforated wound of left cornea below with presentation of iris covered by conjunctiva. Traumatic cataract. Atropin and double bandage.

37. Mrs. R. P. P. Small linear incision made over left lacrimal bone for

escape of particle of glass. Moist dressing.

38. Mrs. M. V-shaped wound of cornea with deposit of lymph about edges. Hyphema. Iris cannot be detected. Edges of wound freed, atropin and bandage.

39. M. D. Opening of conjunctiva over insertion of external rectus muscle for escape of glass particle.

40. L. D. Large perforating wound of right ciliary body above. Globe enucleated.

41. W. A. R. Right eye normal. Large corneo-scleral wound of left eye with prolapse of ciliary body. Enucleation of eye ball.

42. Mrs. W. Left eye completely destroyed. Extensive penetrating necrotic wound of lid. Oil silk inserted in orbit to prevent adhesions of lid to conjunctiva.

43. M. L. Perforated wound of right sclera at temporal side. Incarceration of ciliary body, excised. Perforated wound of left cornea, prolapse of iris, wound granulating over, traumatic cataract. Atropin and double bandage.

44. Mrs. G. N. Right eye collapsed, panophthalmitis. Necrosis of tissues with edema of lids. Enucleated, moist dressing.

45. Mrs. S. Both eyes so destroyed that organs cannot be distinguished. Extensive wounds of face and lids. Moist dressings.

46. A. P. Right eye normal. Perforating wound of left cornea 4 mm. in length opening horizontally toward nasal side of corneo-scleral margin. Iridectomy.

47. M. S. Right eye collapsed, enucleated. Left eye shows multiple incised wounds of cornea extending from center of pupillary area to corneal limbus below. Wound gaping and vitreous presenting. Vitreous excised. Conjunctival flap and bandage.

48. B. C. Vertical incised wound of right cornea. Extends several mm. below the corneo-scleral margin. Wound has already been sutured and

is apparently in a healthy condition. Cornea edematous at temporal side. Atropin and bandage.

We had some exceedingly difficult enucleations where the lids had to be separated by retractors, so intense was the induration, with the attendant necrosis of the conjunctiva. Secondary adhesions rendered our progress slow but in no case did we meet with any untoward complications while operating. In one or two cases I practised the Lister operation, separating the muscles and eviscerating the contents of the globe, at the same time excising most of the sclera and leaving only a small curtain of this tissue about the optic nerve. The idea of this procedure is presumably to offset infection backwards into the orbit. The reaction in these cases seemed to be much greater than in the simple enucleations where drainage forward, in my opinion, was better.

It must be remembered that the eye injury was frequently only an associated condition of the most ghastly incised wounds of the head, face and neck. These wounds were invariably caused by glass and could only be described as hideous; they were all too terrible. Much of our time was consequently taken up by attending to these wounds, the fact of dressing the eye being a mere coincidence. Practically every face wound was septic; nay more, each was welling out with copious purulent discharge while other wounds appeared almost to be gangrenous. An earlier attempt had too often been made to bring the edges of these tears together by sutures, the stitches invariably sloughing out at one side, leaving the adjacent tissue more necrotic. The faces appeared as though some filthy septic claw or rake had been dragged over the face as deeply as it could penetrate. In cases of retained glass a bloody serum kept being exuded rather than pus, this no doubt being due to the irritation caused by the retained glass. In many cases it was marvelous how intense had been the injury inflicted upon one lid while the underlying eyeball had not been disturbed. On the other hand it was equally to be



wondered at how often an eye was picked out by glass while the lid remained uninjured.

One case of the class I have just referred to gave us a great deal of anxiety for a time. The right eye had been enucleated and the left cornea severely injured. There were multiple deep incisions above the right brow and over the right temporal region. These had become septic, although there was no reaction in the orbit following the operation for removal of the eye. On about the fourth day following operation, the patient's general condition being bad, there were severe hemorrhages from four points of the temporal artery. This condition was no doubt brought about by the septic condition of the patient as well as by the necrotic state of the tissues about the arterial capillaries. A compress bandage was useless and an anesthetic had to be given when the bleeding points were tied off and a firm bandage applied and left undisturbed for three days. Recovery was uneventful.

A word regarding our treatment of septic wounds of the face. All cases prior to our arrival had been heavily packed, padded and bandaged. We instituted a revolution in this respect by first cleaning the wounds and loosening all scales and scabs which prevented the free escape of pus. Frequently hydrogen peroxid was applied to the wound followed by tr. iodin to the base and edges. The face was then left practically exposed to the air. It was nothing short of marvelous to note how quickly some of these cases cleaned up under open treatment. In a number of cases I used Eusol, more commonly known as Dakin's Solution, on a damaged face after the eye had been enucleated, care always being taken to protect the side of the face with the undamaged or remaining eye. With the attendant and very evident sepsis of the associated parts it was little less than miraculous how few eyes were secondarily infected following intraocular operations. There were numbers of panophthalmitis it is true; but these were primarily so, prior to admission and before treatment of any

kind had been instituted. I performed a number of iridectomies, excised portions of presenting ciliary bodies in some desperate cases, and attempted the repair of certain wounds of the cornea with fair success. In only one instance from my own series of cases did infection ensue. The exception was the case of a child who probably tried to remove her bandage. Any attempt at bacteriology would have been a burlesque. We made the best effort at asepsis that was possible under the circumstances. I could vouch for my instruments and dressings through Miss Etter's care. I could not employ rubber gloves as I abominate them in eye work. Perhaps there is a certain unrecorded virtue in the frequent application of "Queen's Laundry Bar" or some of the other commoner kitchen varieties of soap which seemed to come to my hand oftener than any other. Perhaps it was because I used strong bichlorid till my hands began to cut, perhaps it was both; but more probably that because our luck was with us. A word for the conjunctival flap, we made use of it in numbers of cases both in scleral wounds as well as in incised wounds of the cornea, and I do not hesitate to affirm that many of our successes were due to our using this precaution. Argylol may have helped in certain cases while atropin was used along general lines as conditions warranted. When possible, all intraocular operations were left undisturbed for two days before I did the first dressing.

To show the wonderful reparative results achieved, I am able to state that Camp Hill Hospital was practically evacuated with the exception of about 100 cases in ten days time, the patients generally being transferred to civilian units or to homes organized for their care in some of the smaller neighboring cities of the Province, as Truro, Windsor, New Glasgow, Sydney. We had only 20 remaining in the eye ward who were cases as a rule waiting for their homes to be reestablished in Halifax, or who were expecting accommodation with relatives or with friends.

In Camp Hill Hospital 1,500 Units of antitetanic serum were given to

each patient, but only on the fifth day after the accident, as a large enough supply could not be obtained at first in the emergency. We did not have a single case of tetanus. One case, I believe, did develop at the Victoria General Hospital, but the condition subsided under treatment, the patient unfortunately dying from a lobar pneumonia. I did not see one case of spreading gangrene, although the *b. aerogenes capsulatus* was noted in four cases in another hospital. We further did not have any cases of erysipelas, although I suspected it in one case, the condition shortly subsiding as a false alarm, much to my peace of mind. There was no meningitis at Camp Hill.

Various reports have been circulated regarding the number of those permanently blinded as the result of the accident. My opinion is that most of these reports have been exaggerated although the number is sufficiently appalling. I estimate that 500 people, or one person in every 150 of the population of Halifax will be or should eventually be wearing an artificial eye. Many will not be able to wear an eye for the reason that there has been irreparable damage done to the lids and face as well as to the orbit. About 200 people will be blind if figures count for anything. I base my figures on the following estimate. The *Halifax Herald* makes the statement that only 3,000 people were injured. If 1,500 were cared for at Camp Hill and if the 8 other units were doing work to full capacity, this number could be easily doubled if one is to include the number of people who were receiving private attention in their own homes or at dressing stations. In my opinion 25 per cent of the casualties were eye cases, making 1,500. Figures compiled from my own wards show permanent blindness in 10 per cent of the cases, which would mean 150 of the total number. This figure will doubtless be augmented to 200 when late manifestations appear in a single remaining injured eye.

There are some questions and problems which will never be answered, or to which history must vouchsafe a re-

ply in the course of time. Were too many eyes removed? I hope not. My time was completely taken up at Camp Hill where I had all that I could attend to. Eye work was done at every other unit or hospital for which I cannot possibly answer. My opinion, from my knowledge of the men entrusted with the work, is that it was conservatively and conscientiously undertaken and carried out. Most of the enucleating at Camp Hill had been performed by my predecessors, Dr. Cox and Dr. McLennan, although a few choice specimens—probably a dozen, complicated cases were left over for my particular edification. From the eyes which I saw remaining and where an honest endeavor had been made at operative repair, I can safely say that no eye was removed at Camp Hill that was not irretrievably lost. One may equally ask the converse, were any injured eyes left where the site of injury might threaten subsequent sympathetic trouble. Where the other eye was injured, no, where both corneae were incised with iris and ciliary bodies presenting, yes. Our hands were absolutely tied under such circumstances. One had no alternative but to trust to a kindly Providence and to hope for the best. The problem which is now confronting the oculists of Halifax is the fate of an eye where a late sympathetic trouble may ensue due to an inclusion of the ciliary body or to the retention of a glass particle in the uveal tract. There is material for a book on plastic operations on the lids and face. No author will ever find more material in so short a compass.

One or two observations in conclusion. I would like to testify to the generous and spontaneous response made by the American medical profession and by the American people in general. It was not a response, for in most cases no appeal for help had been made. The act of service was a spontaneous manifestation of a kindly sympathetic people to neighbors in distress. They were generous and appreciative in the broadest sense of the term. I might mention in particular, the Boston unit, the Maine unit, the Provi-

dence unit. Each came prepared to undertake all forms of work on the shortest possible notice. Take the Providence doctors and nurses who left on two hours' notice. They were traveling on Sunday and wanted some Red Cross insignia. No shops could be found open at any of the stations through which they passed. They finally compromised with the porter of the sleeper for a discarded green curtain and an old sheet. The Providence unit will always be remembered with regard in Halifax as the Order of the Green Cross. On their arrival at Halifax every hospital had a complete staff. Providence started in to do a first aid in a systematic manner by visiting all the homes about the devastated area where families had bravely attempted to hold together, and tabulating such cases, as well as attending to the wounded. When one of the hospitals was later evacuated, Providence took possession with a full complement of patients ready at hand.

It is useless for me to attempt to acknowledge in proper terms the kindly consideration and hospitality of the people of Halifax, civilian as well as military. All were most keenly sensitive of whatever help we were doing our best to afford. All they had was ours and their homes were our billets. My social experience was an extremely happy one, and in spite of my hard work I actually enjoyed myself.

An outstanding feature, and one which impressed me greatly was the absolute abstinence from indulgence in alcohol. One may be a fanatic re-

garding the question from both points of view, another may be uncharitable enough to say that whiskey may always be had, and never easier than in a dry town. I did not detect alcohol in the case of a single patient, relative, soldier, or medical officer at a time when indulgence might almost have been condoned as an only apparent solace in grief and depression.

One of the most remarkable statements which I am able to make is that throughout my service, in the presence of death, of suffering, and following the destruction of all that life and home held for them, I did not see one single tear shed while I was in Halifax. I naturally except the children, where a painful dressing was a sufficient excuse. Were the people as a whole stunned or did higher ideals seem to be uppermost, and the most generous and kindly motives to possess all classes and all natures? Everybody served and served gladly, from the highest to the lowest, and those with minor injuries were happiest when trying to help others with wounds more serious than their own.

And so I have come to the end of my story. As the recital of my surgical experience, necessarily sketchy through the emergency of the situation, it is probably of little value, as the tale of a professional adventure it is possibly of some interest, as the testimony of an endeavor to help a heroic and deserving people, it is no more my own than I feel it to be that of all who have taken the trouble to read of my sojourn in Halifax.

## CANTHOPLASTY FOR TRACHOMATOUS CONDITIONS.

JESSE S. WYLER, M. D.

CINCINNATI, OHIO.

A description of the conditions produced by trachoma that require resort to canthoplasty, and a form of operation devised to meet these special conditions; with three illustrations. Read before the Eye, Ear, Nose and Throat Section of the Ohio State Medical Association at its annual meeting in 1917.

The use of a canthoplasty in certain phases of trachoma is not a new procedure, but has been advocated by nearly all writers who have had large

experience with this disease. It is now just ten years, since I described the extirpation of the transitional folds and tarsal cartilage for the cure of tra-



choma,<sup>1</sup> and time and usage have proven the efficacy of this method.

But the present operation has an entirely different application, and finds its principal advantage in cicatricial stages, with pannus, blepharophimosis and entropion, where a removal of the diseased conjunctiva is impractical, because of the fact that nature in its effort to cure, has converted the entire sac into a shrunken mass of scar tissue. Thereby, not only is the sac greatly contracted, with no healthy mucous membrane remaining; but also this contraction has narrowed the lid fissure and has caused distortion of the lids. The end results thereby produced are:

(1) Insufficient ventilation and poor drainage.

(2) Undue pressure upon the globe with a corresponding increase in corneal destruction.

strongly to him than the widening of the fissure, and it is this result that is produced. Since Prince's time many modifications and new procedures have been published. Herman Kuhnt, who has to my mind done more to systematize the treatment of trachoma than any one individual, perfected a canthoplasty which proved to be the original after which I patterned my own.

A canthoplasty is a permanent enlarging of the lid fissure in contradistinction to a canthotomy, which is only a temporary measure. The ordinary canthoplasty uses the dissected conjunctiva to cover the tissue denuded by the splitting of the lids. This proves unavailing in trachoma as the contracted, scarred membrane is already too small for its required function. It therefore devolves upon the operator to use a method of preventing the healing

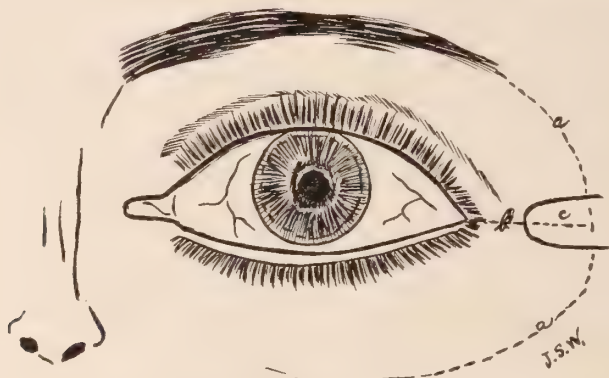


FIGURE 1.

Incisions for Canthoplasty. a Rim of bony orbit; b Direction of canthal ligament and line of the canthotomy; c Incision outlining the flap.

(3) Subjective suffering, from the blepharospasm and trichiasis.

Instead of applying copper sulphat or silver in these conditions and augmenting the already great physical sufferings, with little real benefit, it behooves us to apply a radical measure which will relieve the blepharospasm and enlarge the lid fissure to get improved drainage and make topical applications easier and more efficient.

The first real attempt at operation was made by David Prince in 1866,<sup>2</sup> but a close study of his method reveals the fact that the correction of the existing entropion appealed more

of the divided lids by other means. Although my method approaches that of Kuhnt in theory, the technic and application vary considerably. The idea is based upon the use of a small skin flap to cover the denuded canthal angle.

Its performance is possible in any complication, and can be made practically painless with local anesthesia.

The instruments necessary are few. A horn plate, keratome, fine tooth forceps, straight strong scissors, needle holder, a black silk suture doubly armed with medium size curved surgical needles, and hypodermic syringe for the anesthesia.

**STERILIZATION.**—The lids and surrounding tissue are wiped with benzin and then washed with soap and water. I refrain from the use of iodine when skin flaps are required around the lids. The conjunctival sac is washed out

but a wait of about five minutes is necessary to obtain the full advantage of the anesthesia and anemia.

**OPERATION.**—After inserting the horn plate to protect the eyeball, the temporal side of the lids is put on a

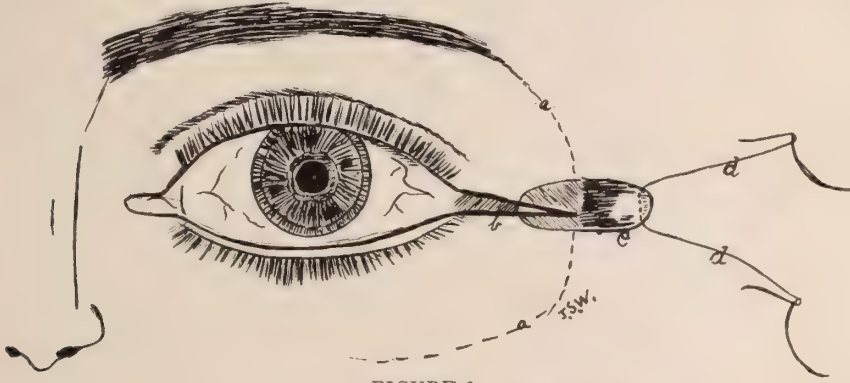


FIGURE 2.

a Margin of orbit; b Incision which lengthens lid fissure; c Flap turned back; d Double-armed suture in flap.

with a sterile solution and the rest of the face is covered with gauze saturated with 1-1000 bichloride of mercury.

**ANESTHESIA.**—The conjunctival sac is cocainized with 2 or 3 drops of 4 per cent cocain solution. The syringe is filled with 6 parts of 1 per cent co-

stretch, and the extent of the flap to be dissected is outlined with the point of a keratome. This tongue of skin starts about 2 mm. beyond the orbital edge and 2 mm. above the horizontal prolongation of the lid fissure, is carried nasally for half the distance to the outer angle, curves around and returns

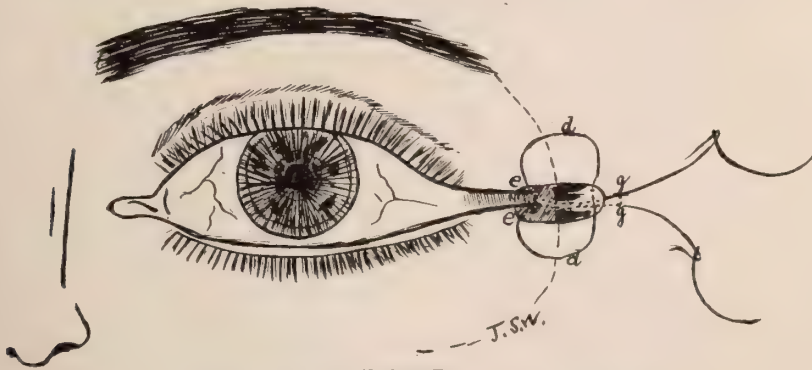


FIGURE 3.

Suture introduced. d Loops of suture; e Entrances of suture, above and below line of canthotomy; g Exits of suture beyond rim of orbit.

cain to 2 parts of adrenalin solution, and the needle inserted on the conjunctival surface of the outer angle, penetrating horizontally under the skin to a distance of about 5 mm. past the orbital rim. Only a few drops are used,

to a point 2 mm. below the horizontal exactly under the first incision. (Fig. 1.) This small skin flap is now carefully dissected up in its entirety and laid back upon the temple. Inserting one blade of a straight scissors into the

conjunctival sac, a horizontal canthotomy is made, reaching to the bony edge of the orbit. The bleeding is very slight due to the adrenalin.

The double armed suture is now inserted through the tip of the flap from the skin surface inward. (Fig. 2.) The needles are then passed one above, the other below the line of the canthotomy, horizontally entering under the palpebral conjunctiva in the extreme angle, passing over the bony edge under the skin of the temple and making their exit about a half inch from the rim of the orbit. (Fig. 3.)

When these two ends are finally tied over a small roll of gauze, the flap is pulled between the cut edges of the skin and lines the angle, readily assuming the crease made by the pressure of the lids, and preventing the denuded surfaces from adhering. No dressing need be applied, as I find the open treatment most favorable for wounds

in this locality. The suture is removed on the third day.

ADVANTAGES.—(1) The operation is easy to perform.

(2) It makes a permanently large fissure.

(3) The patient suffers little discomfort, and need not remain in bed.

The Doctors White in their article of recent date,<sup>3</sup> maintain that the Kuhnt flap does not give a permanent result. However, as far as my flap turning method is concerned, I must take issue with this statement. I have been performing the same canthoplasty for over five years, and after this length of time feel that the results have justified my method. Although the White method is most appealing and most ably described, I have never used it; as I feel that the technic of the flap operation is much easier, and I believe that the cosmetic results, none too good at best, are also more favorable.

#### BIBLIOGRAPHY.

1. Lancet-Clinic, Sept. 7th, 1910.
2. American Jour. Med. Sciences, Oct., 18 66, p. 381.
3. Ophthalmic Record, v. 26, p. 132.

### NEUROBLASTOMA OF THE RETINA.

C. CLARON HUGGER, M. D., AND JONATHAN FORMAN, M. D.

COLUMBUS, OHIO.

Report of a case of so-called glioma of the retina with an account of the pathologic findings in the study of the specimen made in the Laboratory of Pathology of the Ohio State University. Illustrated by microphotographs.

Neuroblastoma is a group term, used by Mallory for those tumors composed of cells which tend to differentiate into nerve cells. He describes ("Principles of Pathologic Histology," 1914, p. 359) the variety of this tumor found in the eye as follows: "It is always congenital and often bilateral. It destroys the eyeball and may invade the brain. When the tumor grows slowly its structure can readily be made out. It forms small gland-like cavities lined by cells which produce more or less perfect rods and cones. These structures project thru a limiting membrane just as in normal retina. From the other

end of each cell projects an axis cylinder process. When the cells proliferate rapidly the gland-like cavities cease to be formed altho the axis cylinder processes may still be. With more rapid growth, cell differentiation ceases and the tumor passes into that ill-defined group, the so-called small round cell sarcoma. Owing to necrosis and absorption, a perithelial arrangement of the tumor cells around the blood vessels is frequent."

The following case illustrates most of the important clinical and pathologic features of this type of tumor:



# NEUROBLASTOMA OF RETINA

HUGGER AND FORMAN

FIG. 1.—A MICROTESSAR PHOTOGRAPH OF  
POSTERIOR PORTION OF EYE, SHOW-  
ING RELATIONS OF TUMOR.  
(SEE TEXT.)

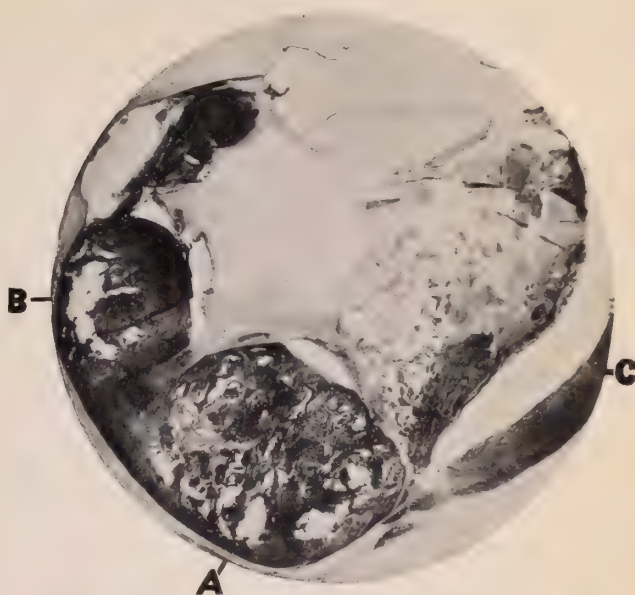


FIG. 2.—AN AREA TO SHOW VARIATION  
IN SIZE OF CELLS.

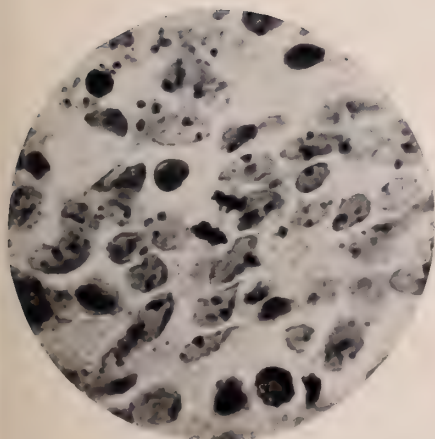
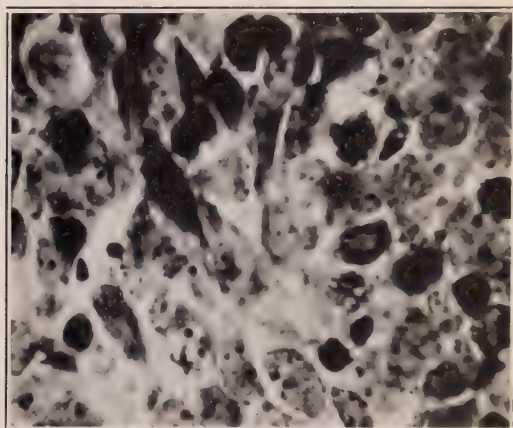


FIG. 3.—A MITOTIC FIGURE IN BORDER OF  
TUMOR MASS.

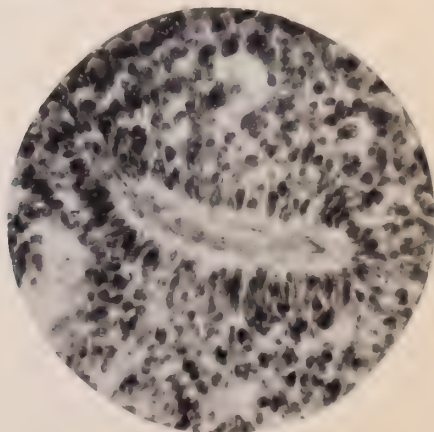


FIG. 4.—ARRANGEMENT OF CELLS ABOUT  
BLOOD VESSELS.



After having consulted several physicians about a swelling of the eye of her two year old child, the mother brought the child to the Park Street Dispensary. At this time, the vitreous cavity was found to contain a distinct mass and a diagnosis of glioma of the retina was made. Removal of the eye was advised but the parents refused. Three months later the child was returned. The bulging of the eye was decidedly more noticeable. The vision was gone and it was impossible to see into the vitreous cavity. Enucleation was again advised but refused.

The condition continued to grow steadily worse until at the end of four weeks the parents begged for an enucleation to be performed. The entire contents of the orbit were eviscerated. In about ten days, a paralysis of the lower extremities occurred. This progressed and extended over the entire body. In about one month from the time of the operation, the child died. An autopsy was not granted.

**PATHOLOGIC REPORT.**—The eye is spherical with a diameter of 2.5 cm.

Upon section the cornea measures 4 mm. in thickness and is regular in contour. From its attachment to about its middle, the iris is in intimate apposition with the posterior surface of the cornea. The lens occupies its normal position and is not the seat of apparent pathologic process. The vitreous cavity presents along its wall four whitish nodules. The largest of these nodules is situated just to the side of the entrance of the optic nerve (Fig. 1a), and measures  $1 \times 0.7$  cm. The greater part of the remaining portion of the cavity is filled with a reddish gray mass.

Microscopic examination reveals the nodules to be portions of an infiltrating tumor. So completely does this tumor line the vitreous cavity that it is not possible to identify the retina at all.

The cells of the tumor vary in shape from large elongated cells to small round ones. In the more differentiated areas the elongated cells contain a nucleus rich in chromatin and placed at the one end. Rarely there is an appar-

ent attempt to form gland-like cavities. In the largest tumor mass near the entrance of the optic nerve, a rather extensive degeneration has occurred among the tumor cells. Only those cells remain which are near a blood vessel. In the border of this mass, mitotic figures are abundant. In the adjacent masses, there is little degeneration. The cells are closely packed and are small and round with a nucleus very rich in chromatin. The stroma is scant and the blood vessels are few. In the posterior portion of the eye, the tumor cells have invaded the choroid and sclera. Using these tissues as a framework they have grown on thru, and a few of the tumor cells appear on the outer surface of the sclera.

On the left side, the smallest mass (Fig. 1b) extends to and infiltrates the ciliary body. The small flat nodule on the right side (Fig. 1c) extends along the wall of the cavity and becoming progressively thinner is lost at the equator.

The material filling the greater part of the remaining portion of the vitreous cavity is an old hemorrhage. It is composed of fibrin, pigment, and calcified plaques. This mass is intimately attached to the tumor mass on the right side by a zone of granulation tissue so that in the process of preparation a line of cleavage has been established in the tumor mass on that side.

To summarize, the position of the tumor, the age of the patient, the clinical course of the tumor, would suggest a neuroblastoma of the retina. The tumor has grown so rapidly that in many areas the tumor consists of masses of closely packed small round cells, making the recognition of the type of the tumor impossible at these points. In the more differentiated areas, however, the tendency to develop tubule-like formations lined by elongated cells which repeat more or less closely the structure of the retina and the production of the axis cylinder processes in the cells of these areas, even where the gland-like structures are not formed, warrant the diagnosis of a neuroblastoma of the retina.



# STEREOSCOPIC AND PERSPECTIVE VISION.

ISADORE FRANKLIN, M. D.

SHEBOYGAN, WIS.

This paper points out the differing significance of these two terms, and indicates the numerous factors that enter into perfect binocular vision. It also suggests the experiment of reversing the position of the two pictures viewed through the stereoscope. This experiment should be tried in order to appreciate the important points brought out in this paper.

Concerning the nature, relationship and *modus operandi* of these two visual senses, there exists in ophthalmic literature, it seems to me, considerable confusion. Dr. Ball in his "Modern Ophthalmology" expresses the prevalent views on the subject, when he says that "This (stereoscopic vision) is another name for binocular vision or the sense of depth." He asserts a truth, when he states that "An object appears to us solid when each eye views it from a different point;" but follows it with the conclusion that "It is the unlikeness of the two pictures which gives the idea of depth." And again that "This (stereoscope) shows that the perception of depth is caused by a slight nonidentity of the retinal images."

By reaffirming well established truths concerning this subject, and treating it from the point of view of my reflections and observations, I hope to show that stereoscopic vision, and perspective vision or the sense of depth, are essentially different, though they complement each other in a rather complicated manner; that neither of them is necessarily binocular; that the stereoscope shows, on the contrary, that it isn't the slight nonidentity of the two retinal images that produces the sense of depth; and finally that stereoscopic and perspective vision are relative terms, the elements of both senses existing in various degrees and combinations in all forms of image formation.

Stereoscopic vision, or sense of solidity or of "relief," or what is more vulgarly, tho very aptly described as "standing out effect," must be sharply differentiated from perspective vision, or sense of depth. *Stereoscopic vision* may be defined as the sense of seeing an object from two different aspects, which through the association of ster-

eoscopic memory gives the impression of solidity. *Perspective vision*, on the other hand, may be defined as the sense of seeing objects at varying distances, which through the association of memory of bodily or limb excursions through space, produces a vivid sense of depth.

In case of stereoscopic vision, it suffices to fix an object with both eyes to get a complete sense of solidity. The muscles of convergence and accommodation, tho in use, are not called into "play." Whereas to obtain a complete sense of depth, it is necessary to converge and accommodate for varying distances. The difference is therefore quite clear: One is static and the other principally dynamic in its nature.

On analyzing the two senses, even apart from their psychologic aspects, the elements that enter into their make-up are surprisingly numerous and complicated. The following are the factors which separately or in combination produce the effects of stereoscopic and perspective vision.

## ELEMENTS OF STEREOSCOPIC VISION OR SENSE OF SOLIDITY

1. Sense of seeing an object from two different aspects.
2. Sense of completeness of image thru the mutually complementing effect of two different images.
3. Shadow effects.
4. Augmenting effect of perspective vision.

## ELEMENTS OF PERSPECTIVE VISION OR SENSE OF DEPTH

1. Sense of seeing objects at varying distances through (a) the play of the muscles of convergence; and (b) the play of the muscle of accommodation.
2. Blurring of part of the field of vision in an antero-posterior direction,

due to (a) doubling in front and beyond point of convergence; (b) being out of focus in front or beyond point of accommodation; (c) diminution of images below visual angle with increasing distance; and (d) atmospheric effects.

3. Relation of size of images to distance.

4. The relative position of objects in which we are accustomed to find them.

5. The enhancing effect of stereoscopic vision.

It is hardly necessary to state that the sense of seeing an object from two different aspects is the most important element in stereoscopic vision. This factor, however, is in its turn composed of the following separate elements: (a) sense of converging muscles; (b) sense of common source of rays [identical location of image on both retinas with respect to field of vision, same side]; (c) sense of difference of the two retinal images. Though the sense of converging muscles is normally a factor in producing the sense of common source of rays, it is not essential, since it may be replaced by prismatic effects. Furthermore, both factors combined, (a) and (b), are incapable of producing a stereoscopic effect without the aid of factor (c), since merely fixing a picture of a solid with both eyes doesn't by itself produce a stereoscopic effect, because of the absence of sense of difference of two retinal images. This last element is therefore important; but only in so far as it contributes to the principal factor, that of seeing a solid from two different aspects. Alone it is quite incapable of producing a stereoscopic effect.

If we hold the two stereoscopic pictures in front of the eyes, so that each eye is looking into the center of its picture and the visual axes are parallel, no stereoscopic effect will be obtained, even though each eye perceives a different image, the reason being that we are looking at both pictures from the same aspect (same plane). True, the pictures must be made to overlap, but not for the mere purpose of "uniting" them, that is incidental, but to give the

eyes the sensation of looking at one thing from two different points.

Nevertheless, the fact that each eye perceives an image from its own point of view is a factor of some value in itself, since each image complementing the other produces a sense of completeness to which we are accustomed when looking at real solids with both eyes.

Powerful as the principal factor of stereoscopic vision is, it is not capable of producing a complete effect without the aid of shadows. A cube, the three presenting sides of which are equally illuminated, will lose a great part of its solid appearance. On the other hand, a picture of a cube drawn with one eye open, but properly shaded, does produce a strong stereoscopic effect. Suffice it furthermore to reflect, that solids do not appear flat, even if one does look at them with one eye; though to be sure, they lose much in "relief." Binocular vision, therefore, tho important, is not essential for stereoscopic vision.

It is in monocular stereoscopic vision particularly, that the contributing effect of perspective vision is of value, since a sense of antero-posterior extension of an object cannot fail to produce a sense of solidity.

#### PERSPECTIVE VISION

In examining the elements of perspective vision, it is obvious that the sense of play of the muscles of convergence is a powerful factor in producing a sense of depth, since the distances of objects correspond to the efforts of convergence; tho it is to be remembered that beyond about twenty feet, it ceases to be of value, (which incidentally applies to the stereoscopic vision.)

In the stereoscope, as well as in real life, it is the principal factor of producing a complete sense of depth. Again, more so than in a case of stereoscopic vision, I must emphasize that it is not the mere dissimilarity of the pictures that produces a sense of depth, but the *actual play of muscles of convergence that the stereoscope as well as conditions in real life require.*

It is almost unbelievable that "flat" pictures in the stereoscope, where all images arise from one plane, should re-

quire the convergence of the visual axes for various distances. It is, however, explained by the following: Because of each picture being taken from a different point of view, the objects in each picture are placed away from its outer field towards the center of binocular fixation (towards inner edge of picture). This relationship is strongest in the foreground of the picture, and is gradually reduced towards the background, i. e. objects in the foreground are displaced more towards the binocular center than those in the background. The result is that the eyes actually converge more for objects that are supposed to be near than for objects that are supposed to be far, giving rise to a powerful sensation of depth.

Supporting proof is to be had in the following experiment: An ordinary stereoscopic card is cut so as to separate the two pictures. They are then approximated with their outer edges, so that they are reversed in relation to each other. Thus placed in the stereoscope, they are brought as near to the eyes as is comfortable. When thus used, a remarkable effect is obtained—the view is turned “inside out,” i. e., objects that should appear in the foreground appear in the background and vice versa. [It may be necessary to look for some time to get the effect, since the other factors of perspective vision militate against such an unnatural arrangement of things.]

The explanation for this phenomenon is easily to be had in the fact that because of the reversed positions of the pictures, the displacement of near objects is toward the outer field instead of the inner field, with the result that the eyes converge less for objects in the foreground than for those in the background; for which reason, what should appear near appears far, and vice versa. It is impossible, on the other hand, to see how the mere interchange of dissimilar pictures, per se, could produce such phenomenon. It appears to me that the theory that “The perception of depth is caused by a slight nonidentity of the two retinal images” is definitely

disproven from the above consideration.

The play of the muscles of accommodation is next in importance. As in the case of convergence, the distance of objects corresponds to the accommodative effort, though again beyond twenty feet it is of no value in judging distance. As already mentioned, it is a great aid to monocular stereoscopic vision. Let us bear in mind that even though we look at a series of solids with only one eye, we still have a strong sense of depth. Thanks to the play of accommodation and several other minor factors, we are able to get a fair sense of depth without binocular vision (convergence play).

The next subjective element in our sense of depth is blurring of a part of the field of vision (in an antero-posterior direction). Experience has taught us that when objects are blurred within twenty feet, it is either because they are in front of or beyond our point of convergence (doubling); or because they are in front or beyond our point of accommodation (out of focus). Ordinarily we are but vaguely aware of the condition, but nevertheless unconsciously, we are in part guided by it in projecting objects into their proper depth. The blurring of images because of increasing distance and because of atmospheric effects (decrease of air transparency, etc.), is of great value in perspective vision beyond the twenty feet limit.

It is common knowledge that we judge distance of objects by comparing their apparent size with what we consider their real size. And this is another useful factor in perspective vision beyond twenty feet. That to a certain extent we judge the relative position of objects as we are accustomed to find them, is perhaps not so generally suspected, but is nevertheless true. For example, a half mile away, we cannot by our natural optical means really tell whether a tree is in front of a building or in its wall. Nevertheless, knowing from experience that trees grow in front of buildings and not in their walls, we are strongly under the impression that we really see it in front of the building.



In this connection, it may be mentioned that the apparent direction of movement of objects and their motion in general, is of some aid in both perspective and stereoscopic vision, as is particularly the case with the "moving picture."

As to stereoscopic vision as a factor in perspective vision, it is but necessary here to repeat that it is in itself an important guide in estimating the depth of objects, since the *solid appearance of objects decreases with distance*.

I am now aware that it will be objected to the idea of regarding minor elements, here enumerated, as genuine factors of stereoscopic and perspective vision, on the ground that they are largely mental in their nature, and not real optico-physiologic phenomena (such as sense of convergence, accommodation, etc.). To this I must point out that neither the sense of solidity nor the sense of depth are purely ocular. Not all the factors of stereoscopic and perspective vision combined could produce either the sense of depth or solidity without the association of other senses, particularly the tactile and muscle senses (of the body in general). Suffice it to mention here, the well known observation that those seeing for the first time must develop a sense of depth and solidity by learning to associate their ocular impressions with their tactile and muscular experiences. In other words, the senses of depth and solidity are neither essentially ocular, nor tactile, nor muscular in their nature; but are a psychic complex, outgrowing principally from the above three senses, but embracing in addition other mental reactions to bodily experience.

It may now be of interest, for the purpose of emphasizing the relativity of the senses of depth and solidity, to briefly examine the combinations of elements

which enter into the various forms of image formation.

Beginning with the photograph, the "flattest" image of all, we find that we are by no means justified in considering it devoid of all stereoscopic and perspective effects. And it is indeed surprising how many of the elements are present. To begin with, in photographs in which the light is well handled, the shadow factor does produce a strong stereoscopic effect. As to perspective effects, all factors, except those of accommodation and convergence play, are present. The sense of depth due to the blurring of objects which are out of focus is especially marked in photographs, for which reason a good photo-portrait rivals a portrait painting in stereoscopic effects.

In paintings this factor is absent, since the artist accommodates, and therefore paints all objects within twenty feet with equal clearness. This is quite a defect, and is one reason why paintings lose in perspective the closer they are looked at. It is however partly compensated by objects being represented "complete"; i. e., as seen with both eyes. In addition, the artistic handling of atmospheric effects in landscapes (and other stimuli to imagination lacking in the photograph), makes the effect of depth in paintings far superior to photographs.

The stereoscope, already discussed, differs from the image formation in actual life by lack of accommodation play, and indeed lack of accommodation altogether, since it is replaced by the use of convex lenses.

As to actual life, it is but necessary to repeat that all factors of stereoscopic and perspective vision are present up to the twenty feet limit. Beyond that everything depending upon convergence and accommodation is, of course, absent.

## PAINFUL ACCOMMODATION.

JOHN GREEN, JR., M. D., F. A. C. S.

ST. LOUIS, MO.

An account of this condition, first described by Donders, with reports of three cases. Read before the American Academy of Ophthalmology and Oto-Laryngology at Pittsburgh, October 30, 1917.

In the last few pages of his epoch-making book "On the Anomalies of Accommodation and Refraction of the Eye,"<sup>1</sup> Donders discusses "Spasm of Accommodation," and "Painful Accommodation." He is careful to distinguish between the normal tone of the ciliary muscle and the "exalted" tone which in hypermetropia and sometimes in astigmatism, "wholly or partially conceals the abnormal condition." He is frankly skeptical about the existence of acute spasm (comparable to the spasm produced by physostigmin) and explains his skepticism on the ground that he has "never met with a clear case of it."

The relation between the physiologic tone and the pathologic exalted tone or contracture of the ciliary muscle is discussed by Lancaster and Williams in their careful study.<sup>2</sup> They quote Howell's text book of Physiology as follows: "By tone is meant a state of continuous contraction which is slight in extent under normal conditions." Contracture is defined by these authors as "a state of maintained contraction, or, looked at from the other end, as it seems to us, better point of view, a state of retarded relaxation." As they remark, "Contracture is an excessive activity and should be stopped"—"tonus is normal and physiologic and does not need to be stopped." The task of the examiner is, therefore, to determine how much of latent hypermetropia is due to tonus, and how much to contracture, and to prescribe a glass which shall do no more than "relieve the excessive action."

We are all familiar with the great variety of asthenopic symptoms, including pain, occurring in hypermetropic individuals as a result of this contracture of the ciliary muscle. The existence of contracture is readily proved by the use of atropin, which discloses the great difference between the manifest and total error.

Accommodation associated with pain due to contracture does not require comment. But there is an important group of cases in which pain, often of great severity, is evoked by accommodation and in which there is little or no evidence of accommodative cramp. It is this accommodative anomaly, designated by Donders "Painful Accommodation," to which I desire to draw your attention. Perhaps a synopsis of a case related by Donders may help to make the clinical picture clear.

A patient residing in the East Indies experienced pain on making observations with optical instruments. His state was considered to be hyperemia of the retina. On reading and in calculating his observations the pain increased. Under atropin, hypermetropia of 1.5 was disclosed. Convex glasses, both weak and strong, failed to relieve. Derivants and leeches were tried, with equal want of success. Reading for a few minutes produced pain which compelled him to desist. After suffering eighteen months he wrote to Donders, who ordered atropin twice a week and convex glasses of different strengths for work at different distances. Almost at once the pain ceased. I give the rest of the history in Donder's own words:

"When after a first disappointment, the use of atropia was, a few months later, for the second time suspended, the pain on tension of the accommodation did not return, and so far as I am aware no disturbance whatever has since recurred in making observations, reading, writing or calculating. This case scarcely needs any comment. It shows that in slight degrees of H. a condition may be developed by continued tension in which the least accommodation for near objects becomes very painful. Spectacles are then of no use, because with the convergence involuntary accommodation is

combined, and this again excites the pain."

Later writers have sought, and with much reason, to associate this accommodative anomaly with certain states of nervous instability,—notably neurasthenia and hysteria. The modern view is well expressed by de Schweinitz,<sup>3</sup> who says:

"Patients of the hysterical type are afflicted with markedly painful visual sensations, notably dread of light, lacrimation, blepharospasm, neuralgic pains which appear in the neighborhood of the ocular globe and radiate to the temporal and zygomatic regions, and imperfect eye endurance. To this set of symptoms the term hyperesthesia of the retina has sometimes been applied. They represent the condition which Förster described as *hysterical kopiopia*, Donders as *painful accommodation*, Nagel as *hyperesthesia of the ciliary muscle*, and Schenkl as *hysterical ocular pain*, but which, in general terms, may be classified under 'painful visual sensation' or 'hysterical asthenopia.'

"Any effort of vision, particularly at close work, is quickly followed by ocular pain, brow neuralgia, and diffuse headache, often with micropsia and obscurity of vision, and quickly by fatigue.

"We have in these cases, according to Binswanger, to deal with hyperalgesia manifesting itself through light impressions, and he believes that these hyperalgesic conditions form part of a general hyperalgesia, most pronounced in certain forms of hystero-neurasthenia."

#### CASE REPORTS:

Mrs. G. D., age 55, consulted me July 17, 1917, with the complaint that for the past six years she has had increasing difficulty and pain in near vision. The condition has become greatly aggravated during the past six months, so that at this time it is "r  al torture" to try to read. Recently, too, she has had "spells of trying to look through shadows." The patient has worn bifocals for thirteen years, has had numerous changes, the last eight months ago.

She is greatly depressed over her ocular troubles, and has about made up her mind that she is doomed to irremediable

pain, if she uses her eyes, and hence has very largely given up near work. Nor is the fear of impending blindness very far in the background. She tells her tale in rather a hopeless way, and clearly conveys the impression that she has lost confidence in all oculists, her present adviser included. She is constantly shifting her position in her chair, throwing her head from side to side, and moving her hands aimlessly. Questioned as to bodily pain, she denies it, but says she is nervous all over and cannot keep still.

Repeated tests indicated a compound hypermetropic astigmatism, but as there was much uncertainty in regard to the strength and axis of the cylinder, homotropin was ordered. The cycloplegic test yielded:

O. D. + 2.75  $\overline{\text{C}}$  + .25 c. ax. 120° V 6/5  
O. S. + 2  $\overline{\text{C}}$  + .75 c. ax. 60° V 6/5

Bifocals, based on a post cycloplegic test, were ordered as follows:

O. D. +3. +.25 c. ax. 120°  
O. S. +2.37 +.62 c. ax. 60°; +2 added.

The muscle balance showed orthophoria at 6 m. and exophoria 3° at 33 cm. Accommodation 1 D. Ophthalmoscope negative, save for a little undue tortuosity of the finer vessels adjacent to the macula. Tension, R. and L. 15 mm. Hg. Fields normal.

As my final result did not differ conspicuously from the prescription given by my predecessor, I felt assured that should I pursue the inquiry no further, I should probably be classified in the patient's mind as the latest and least successful of her ophthalmic advisors. It seemed worth while, therefore, to gain some knowledge of her life and ailments. Hers was the typical story of a farmer's wife—hard physical work, an early struggle to make both ends meet, the bearing of children, and the denial of personal necessities over a long period of years in order that the children might have educational advantages. At the birth of her first child she sustained a bad perineal laceration. This was not repaired and during subsequent pregnancies she suffered extremely. A secondary repair was successfully made fifteen years later. To add to her troubles, her



teeth had given her "lifelong misery." All were finally extracted, save two or three incisors in the lower jaw. Menstruation ceased four years ago.

X-ray examination of the few remaining teeth showed marked pyorrhea and in one an apical abscess. They were extracted. The patient was referred to Dr. F. M. Barnes, Jr., for neurologic examination. His inquiry elicited the following additional facts: On going to bed she has what she calls "nervous fits" for an hour or so, she "wiggles and turns," cannot get to sleep and experiences some disagreeable and uncomfortable sensations in the occipital region. She is inclined to worry over trifles. She has one son of the draft age, but is not worried over the possibility that he may be drafted. The physical and neurologic examination proved wholly negative. Dr. Barnes writes: "It is rather hard to find a definite term which exactly sums up her condition, but perhaps a neurasthenia incident to the period of the menopause expresses it about as well as can be." Ovarian extract was ordered and a strong assurance was given the patient that she would get better. She was dismissed with the injunction to use her eyes for a certain period daily, stopping the moment pain manifested itself, and to endeavor to increase the period of near work each day.

It was clear that the patient had taken a new grip on life; her outlook, filled with gloomy forebodings, had been replaced by optimism. A letter of inquiry recently addressed to the patient elicited the following reply: "After having to begin over several times, I have reached the point where I can read for an hour in the morning and again in the afternoon, but not more than 15 minutes by artificial light. I am getting along very comfortably, eyes and general health both."

Case II. Dr. X consulted me November 8, 1916. In order properly to understand the present state of our patient, it is necessary to sketch, briefly, his career. After graduating in medicine he set out to achieve a large measure of success as a practitioner. The will to do was there, and he had the physical capacity to make his body do his every bid-

ding. He was successful from the start. He entered actively into the work of various medical societies. He held various teaching positions in his medical school and ultimately occupied the chair of surgery. For twenty years it was one continual grind from early morning to late at night. Often he would come in at midnight, tired out after a round of visits, and spend the next two or three hours preparing himself for the next day's lecture or demonstration. And because he had the physique he could do all these things. And so, year after year, he kept driving on—with never a thought of the break that, sooner or later, must come.

In spite of his strenuous life he supported, with equanimity, a moderate hypermetropia, with a low inverse astigmatism. Without experiencing any of the signs of early presbyopia, he reached the age of 47 when, rather suddenly, the accommodative strain became too great. After a morning's operating, he would pass a wretched afternoon, with blood-shot, aching eyes. The oculist consulted prescribed reading and operating glasses with bromides internally. There was no relief, rather the symptoms increased in severity. Finally a sea trip was planned and undertaken. Not for a single moment during this five weeks' vacation were our patient's eyes in the least degree troublesome. He sedulously abstained from reading, and came back early in the autumn rejuvenated and fully convinced that his eye troubles were definitely at an end. But his hopes were dashed the first morning he attempted to operate—the eyes burned and ached. That afternoon was spent on a couch in a dark room with cool cloths applied to the closed lids. Through September and October he led a miserable existence, endeavoring to get through with the accumulated operative work of the summer, and spending his afternoons and evenings in ocular misery. He was fond of social life, but found the bright lights of the drawing room intolerable. "On several occasions," he told me, "it has required all my will power to remain in a friend's house the time demanded by the rules of courtesy." Such an experience would be followed by a sleepless night.

His appearance did not denote a man who had been through great suffering. Rather he seemed well preserved and physically energetic. His refraction proved to be a compound hypermetropic astigmatism as follows:

R. + 0.87  $\overline{\text{C}}$  + 0.5 c. ax. 165° V 6/4  
L. + 1.12  $\overline{\text{C}}$  + 0.37 c. ax. 180° V 6/4

Accommodation 2.75 D. either eye. Muscle balance at 6 m. showed lateral and vertical orthophoria.

Prism adduction 17°, prism abduction 4°; 3° exophoria at 33 cm.

Reading glasses, as follows, were prescribed:

R. + 2.12  $\overline{\text{C}}$  + 0.5 c. ax. 165°  
L. + 2.37  $\overline{\text{C}}$  + 0.37 c. ax. 180°

A week later the patient reported "absolutely no improvement." Distance glasses were prescribed as follows:

R. + .75  $\overline{\text{C}}$  + .37 c. ax. 180°  
L. + 1.  $\overline{\text{C}}$  + .37 c. ax. 180°

A rhinologic examination was negative.

The patient absented himself for a month. On his return he stated that matters had been going from bad to worse; that he had faithfully used the distance and reading correction without any appreciable effect on his symptoms. In despair he had, toward the end of the month, broken away from work and gone to his farm in a distant state. There, freed from the necessity of using his eyes, he had gotten some relief. Immediately on resuming work at home the symptoms had recurred in all their severity. Bifocals were ordered. Astringents were used for several days to combat a slight conjunctival irritation.

One month later (January, 1917), it was clear that no progress was being made. The effort to use the eyes invariably produced an intense deep seated ocular pain, lasting all the rest of the day and often well into the night. At times it became almost unbearable, suggesting morphia which, however, our patient had the good sense to refrain from using.

It was now clear that we were dealing with an intensely irritable ciliary muscle and the indication was for complete

physiologic rest. Accordingly, having satisfied myself of the absence of glaucoma, I prescribed atropin sulphate 1/2% t. i. d. On January 2, 1917, three days later, the patient reappeared, overjoyed, stating that yesterday was the first comfortable day he had had since September. His relief was complete and he was entirely willing to put up with the unpleasantness of a dilated pupil and functionless accommodative apparatus. He was kept completely atropinized (1% five times daily) for three weeks. During this period he was absolutely free from ocular discomfort. His total refractive error proved out:

R. + 1.37  $\overline{\text{C}}$  + 0.25 c. ax. 150° 6/4  
L. + 1.5  $\overline{\text{C}}$  + 0.37 c. ax. 30° 6/4

(If reference is made to the precycloplegic measurement, it will be seen that the latent hypermetropia is only 0.5 D., which is accounted for by the physiologic tone of the ciliary muscle.)

Bifocals were prescribed as follows:

R. + 1.  $\overline{\text{C}}$  + 0.25 c. ax. 150°  
L. + 1.12  $\overline{\text{C}}$  + 0.37 c. ax. 30°; +2 added.

All use of the eyes was interdicted for two weeks more. From this time, progress was slow but steady. In view of the beneficial effect of outdoor life (as evidenced by improvement on former vacations) the patient was urged to abandon his practice and go back to his farm. Fortunately, our views coincided, and early in February, 1917, the patient betook himself to his farm, where he undertook a systematic reeducation of his dilapidated ciliary muscles. In the beginning he was limited to two minutes' reading three times a day. As this amount was possible without ocular discomfort at the time or pain afterward, the periods were gradually increased. Under date of June 21st, he writes, "I am still improving. The last three weeks have been better than any similar period during the past year, except when I was not using my eyes at all for close work. I am now using my eyes forty minutes twice daily without pain."

Case III. Mrs. L. E. H., widow, age 62, first seen Dec. 22, 1916, came complaining of "terrible" suffering when she attempted to use eyes. "The eyes feel

like balls of fire." Examination showed no external ocular abnormality save slight shrinkage of the conjunctiva of the lower fornix (for this I cannot account as there was no history of conjunctival affection). The fundus was normal. Refraction proved to be a compound hypermetropic astigmatism as follows:

R. + 2.25  $\ominus$  + 1.75 c. ax.  $75^\circ = 6/5$   
 L. + 2.  $\ominus$  + 1. c. ax.  $105^\circ = 6/5$

Accommodation 1 D. Orthophoria for distance.  $3^\circ$  exophoria at 33 cm. Prism adduction  $24^\circ$ . Prism abduction  $7^\circ$ . Bifocals prescribed:

R. + 2.25  $\ominus$  + 1.75 c. ax.  $75^\circ$   
 L. + 2.  $\ominus$  + 1. c. ax.  $105^\circ$ ; +3 added.

Examination by Dr. L. K. Guggenheim disclosed a subacute rhinitis and markedly hypertrophied tonsils containing pus. The left ear presented all the symptoms of a chronic adhesive process with atrophic changes in the cochlea. The condition of the tonsils was so bad that, in spite of the patient's age, their removal was deemed imperative. The operation was performed under local anesthesia, and was followed by several days of extreme prostration, during which time the patient remained in the hospital. About two weeks later she appeared at the office, thoroughly shaken, trembling all over, and complaining of great pain in the eyes and head. She was seen at intervals during the winter, her complaint being monotonously the same—utter inability to use the eyes for more than a minute. Efforts to prolong their use were attended by severe burning sensations followed by intense aching pain. The pain did not terminate with the termination of reading, but persisted into the evening and indeed all night. The patient was tractable and willing. She followed instructions to the letter. I hoped, by reading tests of short duration, beginning with one or two minutes, and gradually increasing the period, to train the irritable ciliary muscle to functionate more nearly normally. My endeavors were vain. Toward the end of June she appeared, stating that for several days she had had severe pain in the left upper arm and shoulder. A doctor had told her that she probably had a

"tumor." Fear of amputation and the very evident severe pain, brought her to a pitiable state of nerves and tears. She was on her way to her home town and was about to place herself in the care of her cousin, a physician. Two weeks later she reappeared, her arm and shoulder wholly recovered. Her physician, Dr. Rendleman, of Cairo, Ill., informs me that her trouble was purely functional.

During July she was kept for two weeks under atropia; relief was complete, but after the effect of the drops had worn off she was still wholly unable to use her eyes on account of pain. It seemed clear enough that I might work with the patient till doom's day and yet reach no satisfactory result.

Dr. Barnes, to whom the patient was referred, elicited the following additional data: "The present trouble began about nine years ago, at first with severe supra-orbital headaches, soon after associated with severe pain in the eyes in use. Her illness has been progressive, new symptoms having appeared from time to time until now they are 'almost innumerable'—principal among them are nervousness, 'fainty spells,' indigestion and nausea without vomiting and insomnia.

"The patient talks volubly, recounts her symptoms in great detail and with many extravagant expressions regarding her sufferings. She is accurately oriented in all fields, shows no hallucinations or delusions, her insight is fair, memory unimpaired; there is no evidence of deterioration." There was no organic involvement of the nervous system. Diagnosis: "Presenile Neurosis of the Neurasthenic Type." On account of the age of the patient, prognosis "not good."

The examples of Painful Accommodation related by Donders were all in persons under the presbyopic age, and references to this subject by subsequent writers that I have consulted make no allusion to its occurrence in middle aged and elderly persons. I am inclined to believe that the condition is not so rare as the paucity of references would seem to indicate. No doubt many cases escape us through failure to put ourselves *en rapport* with the whole physical and psychical history of our patients. I am



convinced that there is always a background of physical or mental stress (often both), eventuating, finally, in some form of nervous instability. The painful irritability of the ciliary muscle may be the sole expression of the neurasthenic state, as in the case of Dr. X., or it may be one symptom added to a multitude of other signs of nerve weakness, as in the cases of the two women. The cases related illustrate, also, differences in prognosis. Where the background is neurasthenia due to a passing physical state (as in Mrs. G. D.) or where the ciliary

muscle is solely implicated (Dr. X.), the prognosis is good, although the course may be protracted. But with Mrs. L. H. the situation is different. In her the development of the neurasthenic state has been very gradual—she has passed from middle to old age, acquiring a long list of nervous manifestations. "You cannot teach an old dog new tricks" and you cannot reeducate an elderly neurasthenic. If the prognosis, from the general neurologic standpoint, is dubious, it is not likely that the disordered ocular function can be restored to normal.

#### BIBLIOGRAPHY.

1. Donders. Accommodation and Refraction of the Eye, p. 622.
2. Lancaster and Williams. *Tr. Amer. Academy of Ophth. and Oto-Laryngology*, 1914, p. 170.
3. de Schweinitz: Posey and Spiller, *The Eye and Nervous System*, 1906, p. 640.

### THE TOXIC ACTION OF EMETIN ON THE EYE.

JOHN M. ROBINSON, M. D.

DULUTH, MINN.

The report of accidental and experimental instillations of solutions of emetin into the eye, and their results, including a special form of irritation, myopia and spasm of accommodation.

CASE 1. A 2 per cent solution of homatropin hydrobromid was ordered for a young woman, with directions to use the drops every half hour, but when she came for her examination there was little or no cycloplegic action, so another bottle was used. At this time there was no redness nor complaint of smarting; but ten hours later she first noticed that the eyes "began to look pink," and at the end of sixteen hours watering and burning was complained of.

I saw the girl twenty-four hours after the original solution had been used: there was then photophobia and profuse lacrimation; the lids were held very tightly closed; there was complaint of burning and smarting, headache and pain radiating through the frontal region. The bulbar conjunctiva was purplish-red, and there was some pericorneal injection; skin of the upper lid slightly edematous; no chemosis; no catarrhal or purulent discharge; cornea clear and the iris apparently uninvolved. This lively

reaction persisted for a day or two, and then subsided so that the eyes were again normal in appearance at the end of a week.

CASE 2. The solution used by the girl was examined as to taste, appearance and chemical reaction: it answered to that of an alkaloidal salt. The pharmacist who had put it up gave assurance that no error had been made. It was rather taken that we had to deal with an idiosyncrasy, and as the girl expressed great fear that she was going blind, partly to reassure her, a small drop of the solution was touched to the conjunctiva of my own lower left lid. Twelve hours later I retired for the night, having quite forgotten the small incident.

I was awakened very early in the morning by a sharp sensation, such as that produced by a foreign body on the cornea. The irritation which was somewhat intermittent in character continued to increase and was at its height in about eight hours. There was a constant

"scratchy" feeling in the eye which became very intense at about five minute intervals, this being accompanied by a spurting of tears from between the spasmodically closed lids, or down through the left nostril—virtually, an ocular tenesmus.

These attacks were at times attended by sprays of sharp pain radiating through the infra- and supraorbital regions. The globe was slightly sensitive to pressure in the ciliary region. Cocain was of no avail, but cold compresses gave some relief. Vision was not actually disturbed, aside from the blurring caused by the active lacrimation. The upper lid became edematous, but there was no chemosis. The pericorneal injection, and the same violet color of the bulb were again present, as in the case of the girl.

In neither of us was it possible to examine the fundus. The active sensory disturbance persisted for thirty-six hours, after which there remained marked redness of the eyeball for over ten days. A few pinpoint subconjunctival hemorrhages were noted. There persisted through a fortnight a spasmodic myopic astigmatism which at first required — 3.50 sph.  $\ominus$  — 3.50 cyl. axis  $180^\circ$ , above my normal correction to bring the vision up to 20/30. For two weeks after this myopia had disappeared the eye was able to read without its normal presbyopic correction of + 1.00 sph.

The few drops of the dubious solution precluded a chemical analysis. One drop was placed in a rabbit's eye; no reaction for ten hours, but on the day following there was a pronounced congestion. The animal continued to eat, but kept the affected eye closed for two days. Redness gone in three days. A few known alkaloids were now tried on the rabbit's eye, and it was found that emetin alone—in 2 per cent strength—produced the identical reaction as to time and degree.

The hydrobromid salt of this alkaloid had been kept next to homatropin in the pharmacy where the dubious solution had been prepared. The evidence was to me fairly conclusive. I had, however, a patient afflicted with a very old trachoma and a pannus. The nature of the procedure was explained, and one drop of a 1

per cent emetin hydrobromid solution was allowed to remain in the eye for half a minute, and was then washed away. At the end of ten hours there commenced a reaction closely corresponding to those above related, but much milder in degree. The vessels running in the pannus were not found to be much engorged. The course of the disease was not affected.

The general toxicology of emetin has recently been discussed in detail by Levy and Rowntree,<sup>1</sup> Lyons<sup>2</sup> and others.<sup>3</sup> Contrary to the more common opinion the alkaloid often acts as an irritant when used in small doses, producing vomiting and purgation. Among the pathologic findings in animals which have been killed by emetin are hemorrhagic swelling of the gastro-intestinal mucosa, and great engorgement of the abdominal vessels with blood. Peripheral neuritis has in several instances followed the administration of ordinary therapeutic doses. The action on the eye then seems to follow quite closely the toxic effects on other organs and parts; moderately slow in action; little effect on the epithelium and superficial vessels, but deep engorgement, and probably direct attack on the peripheral nerves. In my own case the ciliary tenderness, circumcorneal injection, and after-resulting spasmodic myopia point to a special ciliary involvement rather unique in ophthalmic toxicology.

That ipecac powder is irritating to the nasal and bronchial membranes has long been known. A form of "conjunctivitis" has been attributed to the drug. Ipecac also contains the alkaloid cephaelin which has irritant properties aside from those of emetin. Lewin and Guillery<sup>4</sup> describe the effect of "ipecac dust" on the exposed mucous membrane, and they assume that the irritation is due to the contained emetin, and speak even of the possibility of corneal ulceration. But their description, while having certain points of similarity, does not fully correspond to the detail of the cases here reported. More recently Kalt, Fromaget and Harriet<sup>5</sup> have described a subacute, eczematous type of conjunctivitis due to ipecac, sometimes intentionally applied. A dirty red, salmonlike color of the mucosa is said to be characteristic. I

find no reference to the action of emetin itself on the eye other than a brief note of warning by Dr. J. B. Blue.<sup>5</sup>

The active principle, or dried substance of many of the drugs which act as emetics or drastic cathartics will on gaining access to the eye surface produce a lively reaction. As in the case of emetin the disturbance may not be immediate nor the attack primarily on the conjunctiva. *Veratrum album* and *veratrum viride* are both irritants belonging to this class. The alkaloid veratin is more especially dangerous, and may even act as an ocular irritant by systemic absorption. *Colchicum* and *colchicin*, *lobelia* and *lobelin*, both emetic and purgative in slightly toxic dosage, are local eye poisons.

The acrid milky juice of nearly all of the plants of the genus *Euphorbia* come close to this toxic division. The "American ipecac" (*E. Ipecacuanha*), some times used as a substitute for the true Brazilian article, is an eye irritant. The

milk of the flowering spurge and the cypress spurge have caused some damage along this line; while "wolf's milk" (*E. Helioscopia*), long popular in Europe as a remover of warts, has caused not a little serious eye damage when it has been used on the face. The oriental "mudar and yercum," of the family *Asclepias*, are emeto-cathartic in full dosage, and have some reputation as eye poisons. At least two well known cathartics, *elaterium* and *podophyllin*, have had local ocular inflammation charged to them. In this class *croton oil* is the arch offender. It waits about ten minutes to commence its destruction. One drop is enough to put out an eye. *Castor oil*, one of the mildest of oily collyria, is certainly a purgative innocent of damage to the eye, but the castor bean is a mucus membrane irritant of considerable action.

[The recent use of ipecac to produce conjunctivitis, as reported in recent journals (6) and (7) gives especial interest to these observations.]

#### BIBLIOGRAPHY.

1. Levy and Rowntree. *Arch. of Int. Med.*, Nov., 1916.
2. Lyons. *Am. Journ. Med. Sc.*, 1915, p. 97.
3. *Progressive Medicine*, Dec., 1917. Review of emetin poisoning.
4. Lewin and Guillery. *Die Wirkungen von Arzneimitteln und Giften aus das Auge*. (1905). B. I. s. 774. See also same work for other ocular poisons above mentioned.
5. Blue, J. B. *Journ. A. M. A.*, Vol. LXV., p. 1297. Correspondence.
6. *Ophthalmic Year Book*, v. 13, p. 108. and p. 29.
7. *American Journal of Ophthalmology*, v. 1, No. 3, Digest of Literature, p. 34.

#### OCULAR LESIONS THE RESULT OF ORAL AND PHARYNGEAL DISEASES.

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This is a general review of the present status of our knowledge regarding the subject. Read before a joint meeting of the Section on Ophthalmology and Section on Otology and Laryngology of the College of Physicians of Philadelphia, December 7th, 1917, with a bibliography.

The subject of the association of ocular disease with lesions of the mouth and pharynx may be considered under two heads—ocular lesions due to disease of the mouth and pharynx; and, associated lesions of the eye, mouth and pharynx. Time will permit of a discussion of the first class only.

That a causal relation may exist between dental lesions and ocular af-

fections is not a new thought but the proof of this relationship we owe to advances in serologic and X-ray diagnosis. A review of the cases in which this relationship was believed to have existed, shows that in many instances, this conclusion has been reached on insufficient evidence, the case either not having been thoroughly studied, that other well known causes



might be excluded; or, where proper methods have been pursued, undue importance has been attributed to a focal lesion in the presence of other possible causes.

A consideration of dental lesions falls naturally into the two groups under which they have been discussed by Black,<sup>1</sup> a dental surgeon of Chicago: (1) Reflex neuroses presenting as sensory, vasomotor or muscular disorders; (2) Inflammation of the various tissues of the eye due to infection. According to this writer, the former are practically always due to irritation of the vital pulp of a tooth, although an occasional case may be due to an impacted tooth. The latter are practically always due to an infection involving the peridental membrane either in the form of an alveolar abscess at the root or a pus pocket along side the root.

#### REFLEX NEUROSES.

It is interesting to note that of the first ten cases of ocular disturbances attributed to dental origin recorded in odontologic literature from 1842 to 1869, ten years of which period was pre-ophthalmoscopic, and the remainder before the ophthalmoscope had any large employment, in all but one, the affection was described as amaurosis; and further, that of 41 references cited by Black from dental journals, in which no less than 27 eye conditions were scheduled, more than one-half were also cases of amaurosis. Bruner,<sup>2</sup> who has recently made a review of the literature, and added cases of his own, enumerates the following reflex conditions: spasm of accommodation, restriction or paralysis of accommodation, spasm of the orbicularis, heterophoria, asthenopia and amblyopia with negative ophthalmic findings. In his opinion affections of the upper jaw teeth are more prone to cause ocular symptoms.

Priestley Smith attributed to dental irritation a case of glaucoma. Of considerable interest in demonstrating the severity of reflex symptoms is Dutrow's<sup>3</sup> case, in which in a man 22 years of age, headache, vomiting, complete paralysis of the left externus with spasmodic contraction of the levators of the opposite

eye were entirely relieved by the removal of an impacted third molar. Both normal and complicated dentition may give rise to ocular symptoms; thus Palet has seen kerato-iritis, spasmodic contraction of the facial muscle, conjunctivitis and lacrimation apparently due to irritation arising in the course of the first and second dentitions. That the pressure of a foreign body in a tooth may excite reflex ocular symptoms is attested by the case seen by Würdemann<sup>4</sup> in which severe retrobulbar pain of years' duration was due to a dental spur which extruded from the root of a filled and crowned tooth. Pont's<sup>5</sup> case of temporary disturbance of vision was associated with traumatism of the alveolar-dental ligament by a dental instrument. Both Blum<sup>6</sup> and Brinton, who report several instances of keratitis arising from dental caries, attribute the corneal complication to trophic influences through the 5th nerve and Gasserian ganglion.

#### ORAL SEPSIS.

A subject of first importance is the ocular lesions arising from oral sepsis. The teeth most often are the seat of the focus of infection. The wide prevalence of amebic disease of the mouth is shown by the investigations of Anna Williams<sup>7</sup> among school children between the ages of 5 and 16 years. She found the ameba present in 29 per cent of children with healthy gums, in 37 per cent with healthy gums but diseased teeth, in 65 per cent with tartar and receding gums, and in 91 per cent of those having spongy and bleeding gums. The oft quoted work of Smith and Barrett<sup>8</sup> demonstrating the relation of parasitic amebas to pyorrhea alveolaris, and the conclusion that they originate bacterial toxins, which not unlikely play a more important part than the amebic toxins themselves, has been of great aid in stimulating the study of the relation of these to ocular disease. Hartzell has shown that 90 per cent of all apical infections yield cultures of streptococcus viridans.

Considering then the wide prevalence of oral sepsis, the generation of endotoxins by the ameba present, and the virulence of the organisms found in apical abscesses, the comparative infrequency

of distant infection can only be explained by a high resistance in the system developed by their long continued presence.

Among the case histories of 10,000 private patients collected by Lang<sup>9</sup> were 215 instances of ocular inflammation in which oral sepsis was traced as the cause. Of these 139 were attributed to pyorrhea alveolaris. The iris was affected 87 times, the ciliary body 79 times and the choroid 65 times. Worth estimates that in more than one-half of the cases of iridocyclitis met with in private practice sepsis (including oral) was the cause, and Butler's<sup>10</sup> experience coincides with this. Ridley mentions a case of persistent iridocyclitis in which the infection seemed to arise from the presence in the postnasal region and at the roots of dead teeth of large numbers of pneumococci and streptococci. The blood gave a pure culture and the feces showed enormous numbers of the organisms. In the well known study by Brown and Irons<sup>11</sup> of 100 cases of non-traumatic iritis in 41 patients, dental infections were demonstrated by radiographs and confirmed by dental surgeons, and in 18 instances these were recognized as the cause of the iritis. Goulden<sup>12</sup> and also Sedwick<sup>13</sup> record instances of recurrent iridocyclitis from oral sepsis. de Schweinitz<sup>14</sup> gives the history of a case of persistent and one of relapsing uveitis due to abscessed teeth; and in commenting upon Goulden's and his own observations says that they indicate that oral sepsis "not only is an etiologic factor in the origin of uveal tract inflammation, but is an important factor in determining, on the one hand, exacerbations, and on the other hand, relapses."

I have had one case in which an abscessed tooth was the probable cause of an exudative choroiditis. The patient was a married woman 26 years of age. The choroidal lesion was just behind the ciliary body and occupied an area  $1\frac{1}{2}$  times the size of the papilla. There were vitreous opacities and deposits on the membrane of Descemet. The serologic tests and blood and urinalysis, made by Dr. Williams, were negative. No examination of the teeth was

made until two weeks later, when an abscess was found at the root of the right upper incisor. The treatment of the tooth was followed by rapid improvement in the ocular symptoms, the vitreous opacities alone persisting.

Among ocular conditions less frequently attributed to oral sepsis are episcleritis (Lang), keratitis (Haskins),<sup>15</sup> persistent conjunctivitis, disseminated choroiditis (Davis), herpetic keratitis (Blum). Black mentions a case of exogenous transmission of oral sepsis to the eye. The patient had an abscessed root which caused a slight swelling of the gum. He was in the habit of breaking the abscess by pressure with the finger, subsequently carrying the infection to the eye. In this connection it is interesting to note that among the means of producing conjunctivitis employed by soldiers abroad has been the introduction into the conjunctival culdesac of tartar scraped from the teeth. In Black's case of chronic catarrhal conjunctivitis, which resisted the therapeutic resourcefulness of Casey Wood for 4 years, the patient possessed 27 teeth and 18 of these had pus pockets. Proper dental treatment permanently cured the conjunctivitis.

#### TONSILS.

That the tonsils have not more often been found to be the source of the ocular infection is surprising, when we consider how frequently they are blamed for general infection. To quote again from Brown and Irons' analysis of 100 cases of iritis, in 16 the tonsils were said to have been clearly the source of infection, and in several cases of iritis due to other causes the tonsils were found containing pus. Wescott,<sup>16</sup> who has seen a number of cases of iritis due to tonsillar infection thinks the exciting cause of the ocular inflammation may be a slight trauma. In one of the two cases of paralysis of accommodation due to faucial tonsillar infection, reported by Veasey<sup>17</sup> the iris was also involved. In the second case the tonsillitis was of an acute relapsing type, the diphtheria bacillus was not found and reading power was quickly restored after extirpation of the tonsils.



## PHARYNX.

Schmigelsky, in 541 cases of trachoma and 85 cases of follicular conjunctivitis, found follicular pharyngitis present 351 times, or 64 per cent. As in follicular pharyngitis normal conjunctivas were present in but 42 per cent, he concludes that a causal relation exists between follicular pharyngitis, follicular conjunctivitis and trachoma. Unhygienic conditions of the nasopharynx is held responsible as a factor in phlyctenular disease by Allen and many other clinicians.

May finds that adenoids in children may be associated with blepharitis, dacryocystitis, congestion of the conjunctiva and phlyctenular disease, and certain forms of conjunctivitis resembling trachoma, and regards them as predisposing to these conditions or aggravating them, a connection explained by the congestion of neighboring parts produced by the adenoids. In a similar way may be explained Posey's<sup>18</sup> case of exophthalmos due to adenoids.

Kirkendall believes that they operate to produce phlyctenular kerato-conjunctivitis by causing the rheumatic diathesis and deflected septa, which produces pharyngeal catarrh, sinusitis, autotoxemia and infection. Adams cites a number of cases to support his contention that adenoids by interfering with the nasal circulation and causing catarrh, and also interfering with the ocular circulation, produce a hyperemia and disturbance of the choroidal pigment readily discernible with the ophthalmoscope, and that amblyopia may frequently be relieved by timely removal of the adenoid hypertrophy.

POST OPERATIVE OCULAR COMPLICATIONS  
OF ORAL ORIGIN.

It has been the experience of all operators to have a continuance of ciliary injection with photophobia, lacrimation, or even a gelatinous iritis, following a technically correct operation more particularly for cataract, in which no local condition or exogenous infection seemed responsible, to subside after extraction of an abscessed tooth. The literature is not without like reports. Thus Fox<sup>19</sup> records 2 cases in

which postoperative suppuration was controlled and the eyeball saved by prompt and effective treatment of the dental lesion. In the presence of foci of infection these are removed and antitoxin employed before and after the operation.

Francis<sup>20</sup> had symptoms of infection occur two days after cataract extraction coincident with the development of tonsillitis. Usual modes of treatment failed but the use of mixed polyvalent staphylococcic vaccine was followed by distinct improvement. He regarded the ocular process embolic from the tonsils. De O'Barrio has noted in 6 cases after cataract extraction, vasomotor disturbance manifesting itself in alarming redness of the conjunctiva, immediately subside after the extraction of diseased teeth.

OCULAR SYMPTOMS DEVELOPING AFTER  
TOOTH EXTRACTION.

Gutman<sup>21</sup> saw, in a boy 12 years of age, bilateral exophthalmos with congestion of ocular and orbital tissue and death from purulent meningitis follow the extraction of a right upper molar. He believes that the septic process began in the alveolus, either from infection subsequent to the extraction, or from septic instruments. A second somewhat similar case in a woman 41 years of age is reported by the same author, death being due to thrombosis of the cavernous sinus. In a third case postneuritic atrophy followed the extraction of an upper molar, the inflammation extending by the way of the antrum. Bruner cites a case of blindness, and Woods<sup>22</sup> one of exacerbation of a uveitis following tooth extraction.

## ROUTE OF IRRITATION AND INFECTION.

The opinion of a dental surgeon (Black) may be invoked to explain the ocular manifestation of reflex dental origin. He states the cause to be an irritation of a vital pulp of a tooth; usually of thermal origin, hot or cold, foods or drinks; or contact of a foreign substance where the pulp is exposed. He points out that an exposed pulp may be infected and yet remain vital or partially so for a long time. Pressure on the terminal branches of the



fifth nerve within the pulp chamber of the tooth excites the reflex.

The route of infection is either directly into the blood and lymph streams, or by extension of the septic process, either by way of the antral mucous membrane or by the periosteum. Brown and Irons consider that several factors are concerned; the periodic entrance into the blood streams of organisms from such foci, and their lodgment in the eye either by reason of their greater number as in sepsis or by fortuitous embolism, changes in the eye itself, either in vascular anastomoses or in susceptibility of the ocular tissues owing to previous injury; and finally, changes in the organism itself whereby it may become better able for a time to maintain itself in the tissues of the eye.

Rosenow<sup>23</sup> considers localization to the iris and ciliary body as not accidental; but that here there is a gradation from an abundant to a poor blood supply predisposing to the localization and growth of bacteria. Ibershoff<sup>24</sup> is correct in the main in stating that the ocular effects are manifested only after a long and variable time, and the progress is gradual and insidious.

The only experimental evidence is that supplied by Fisher, who succeeded in producing choroidal changes in a rabbit from cultures from diseased tonsils removed from a patient with chronic choroiditis.

It will be seen that uveitis is the type of ocular inflammation which most

often is attributed to focal infection. But the structures here involved are those which are particularly susceptible to the toxemia of the bacillus tuberculosis and the spirocheta pallida; and, as Marple<sup>25</sup> has stated, there are no distinguishing peculiarities about an iritis from focal infection. As is well known, tuberculosis as a cause is most difficult to exclude; and, as was emphasized by Axenfeld, this difficulty does not end at the bedside but continues to the post mortem room and pathologic laboratory.

With syphilis it is different, as the weakness of the Wassermann test is in its negative phase and a strongly positive reaction leaves no doubt as to the active presence of the spirochete and its probable guilt, and if this is not conclusive we have remedies so potent against it that therapeutic proof can be soon added. It is needless to say that the mere presence of an abscessed tooth or a pyorrhea proves nothing. Here as elsewhere must other possible causes be eliminated. But even in their presence it must be demonstrated that treatment directed towards their removal failed, whereas the removal of the supposed source of infection alone brought cure.

In closing I should like to quote Herman Knapp who, according to Marple, once said, "We cannot reach a satisfactory conclusion on any subject until its boom has subsided," and in relation to this subject this period has not yet been reached.

#### BIBLIOGRAPHY.

1. Black. *Ophthalmic Record*, v. 24, p. 610.
2. Bruner. *Ann. of Ophth.*, v. 21, p. 744.
3. Dutrow. *Ophthalmic Record*, v. 24, p. 253.
4. Würdemann. *Ophthalmic Record*, v. 22, p. 652.
5. Pont. *La Clinique Ophtalmologique*, 1916, p. 695.
6. Blum. *Ophthalmic Record*, v. 25, p. 389.
7. Williams. *New York State Jour. Med.*, v. 14, p. 579.
8. Barrett. *Jour. Amer. Med. Assn.*, v. 43, No. 20.
9. Lang. *Brit. Med. Jour.*, Feb. 24, 1913.
10. Butler. *Brit. Med. Jour.*, August 27, 1910.
11. Brown and Irons. *Amer. Ophth. Soc.*, v. 14, p. 495.
12. Goulden. *Ophthalmoscope*, v. 9, p. 177.
13. Sedwick. *Ophthalmic Record*, v. 25, p. 261.
14. de Schweinitz. *Coll. Phys. Phila.*, Sec. on *Ophth.*, v. 37, p. 385.
15. Haskins. *Arch. of Ophth.*, v. 45, p. 483.
16. Wescott. *Railway Surg. Jour.*, v. 22, p. 457.
17. Veasey. *Ophthalmic Record*, v. 25, p. 379.
18. Posey. *Ophthalmic Record*, v. 23, p. 587.

19. Fox. *Ophthalmology*, v. 21, p. 446.
20. Francis. *New York Med. Journ.*, v. 16, p. 447.
21. Gutmann. *Ophth. Rev.*, v. 31, p. 160.
22. Woods. *Ophthalmic Record*, v. 24, p. 547.
23. Rosenow. *Jour. Inf. Dis.*, v. 17, p. 403.
24. Ibershoff. *Jour. Ophth. Otol. and Laryngol.*, 1916, p. 812.
25. Marple. *New York Med. Jour.*, 1888, April 14.

## POWER OF THE EYE TO SUSTAIN CLEAR AND COMFORTABLE SEEING WITH DIFFERENT ILLUMINANTS.

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In previous papers (1 and 2), a study has been made of the effect on the eye of differences in the way in which light is delivered to it from a given type of illuminant. In the work of the present paper a series of tests is begun on the effect of the illuminant itself. Eleven of the more common illuminants have been tested with the same conditions of installation, shading, etc., and a correlation has been made between the lighting effects obtained and the power to sustain clear and comfortable seeing.

### INTRODUCTION.

The belief seems to prevail among laymen and not a few technical and medical men that the kerosene flame as a source of light possesses advantages for the eye not to be had by other illuminants, more particularly the incandescent solids. At one of the earlier meetings of the American Medical Association's Subcommittee on the Hygiene of the Eye, the belief was expressed and quite favorably received that of all of the common illuminants the kerosene flame gives the best light for the eye and that it should be taken as our model for hygienic lighting. An eminent ophthalmologist writes<sup>3</sup>: "It has been shown by experiment that the light which gives the maximum of illumination with the minimum of irritation to the eye is composed of the yellowish rays of the middle of the spectrum. For this reason the old fashioned candle and kerosene lamp have never gone entirely out of fashion." In a more recent article<sup>4</sup> in the same journal we find a section on "Simulating Old Illuminants," and in the last paper read before the Philadelphia section of the Illuminating Engineering Society a growing sentiment for the older illuminants was noted.<sup>5</sup>

Leaving out of consideration the many things that have been said in

popular and semitechnical publications on the effect on the eye of the color value of light, of which subject we do not wish to make a special point prior to experimentation, these are only a few of the more familiar statements of opinion that may be cited in evidence that there is a need for testing the effect on the eye of the light of the older illuminants (more especially the kerosene flame) as compared with the more modern illuminants with the intensity, conditions of shading, installation and use, etc., the same in each case.

Two divisions may be made of this comparison: (a) with the illuminants compared used for the purpose of general illumination, and (b) with these illuminants adapted to local, reading table or desk lighting. In the first of these cases differences in result would perhaps be more apt to occur, because of the greater number and complexity of the factors present and the greater difference in difficulty in protecting the eye from unfavorable conditions relating to a set of factors which we have hitherto called the distribution factors. It is quite probable also that a comparative rating of illuminants made on the basis of local lighting, in which case it is not difficult, for example, to eliminate high brilliancies from the field of view, will not hold for gener-

lighting, in which case the chief difficulty seems to be to protect the eye from high brilliancies.

Because, however, of the greater difficulty in getting comparable installations for general lighting, we have chosen to make the first series of tests with local lighting given by a single unit, a one-burner student lamp of the standard type with modifications suitable for the different illuminants employed. We have been led to choose this particular type of unit in part because the belief in the superiority of the kerosene flame for the eye is in the minds of those we have questioned associated largely with the lighting effects given by the student lamp; and in part because this lamp is well adapted for the control of conditions under which we wish the first series of tests to be made.

#### CONDITIONS TESTED.

Two series of experiments were conducted. In the first series the illuminants tested were a kerosene flame; a 50-watt, clear, metallized filament (Gem) carbon lamp; a 15-watt, clear, "mazda, type B" tungsten lamp (round bulb); a 60-watt, clear, "mazda, type B" lamp; a 75-watt "mazda, type C" lamp; and a 75-watt "mazda, type C-2" lamp.\* The kerosene flame (Luster-lite kerosene) was burned at a height of 3 inches and had a horizontal candlepower of 15.8. For the sake of comparison with the kerosene flame it might have been desirable to have conducted the tests with the other illuminants equal to it photometrically, or approximately so, as well as with an equally illuminated reading page and test object. This was, of course, impracticable in case of the "mazda, type C" lamps. For this reason two "mazda, type B" lamps were used,—one as nearly as possible equal in candlepower to the kerosene flame, the other to the two "type C" lamps.

In choosing the sources, care was taken also to have them all as nearly as possible of the same size or to have

a check condition on this factor analogous to that described above; and to adjust the position of the lamp so as to sustain approximately the same relation to the shade. The bottom of the shade was, for example, in each case 2.5 cm. below the center of the luminous source.

The lamp was placed behind and to the left of the observer in the position that was judged by several observers to give the most favorable conditions for reading. This position may be roughly specified as follows: The angle with the median plane of the observer made by a plane passing vertically thru the center of the unit was approximately 21 degrees; and the line in the latter plane connecting the bottom of the shade with the center of the reading page formed an angle of approximately 38.5 degrees, with the horizontal plane passing through the center of the reading page. The reading page was supported by a rack fastened to the upright to which was attached the mouth-board used by the observer in taking the 3-min. record before and after work. This rack was inclined at an angle of approximately 30 degrees with the vertical. To insure that the same amount of light fell on the reading page in each case, the brightness of the page was measured before and after work by means of a Sharp-Millar illuminometer, with the test plate removed and calibrated to give readings directly in candlepower per square inch.

The changes needed to give equality of illumination on the reading page were made by changing the distance of the lamp from the page. These changes in case of the first three illuminants were very small. For the remainder, owing to the greater difference in the candlepower of the lights used, the equalization required that a greater difference in the distance of the lamp from the reading page be employed. This meant a slightly greater difference in the amount of general illumination given and a slightly

\*Trade definitions: Gas-filled, daylight (blue) glass incandescent lamp—Mazda C-2. Gas-filled, clear glass incandescent lamp—Mazda C. Vacuum, clear glass incandescent lamp—Mazda B.



greater difference in the brightness of the surroundings. That is, the lamps of higher candlepower, placed at a greater distance from the reading page, illuminated a larger field than the lamps of lower candlepower. In making these changes of distance care was taken to keep the angle at which the light fell on the page in all cases the same. Some difficulty was given also

"mazda, type B" lamp and an Ivanhoe-Regent steel reflector of the intensive type, aluminum lined, were used, placed in front and to one side of the test object at the distance and angle needed to give the required illumination. In order that the test object alone should be illuminated and not the surrounding wall, objects, etc., the opening of the reflector was covered, and an



FIG. 1.

Test Room showing position of source of light (student lamp) reader and page, in measuring the power of the eye to sustain clear and comfortable vision.

by the difference in the length of the lamps employed. For example, the long stems of the "type C" lamps made it necessary that the shade be raised if the filaments were to have approximately the same position in the shade as were had by the kerosene flame and the filaments of the shorter lamps. To take care of the needed adjustment in the height of the shade an extension shade holder was used.

Owing to the angle of direction of the light and the distance of the lamp, the test object had to be illuminated from a separate source. For this a

oblong aperture was cut of the size and shape needed to give the cross section of light desired. The position of this aperture in the opening of the reflector was chosen with reference to giving the most even illumination of the test object. That is, the light was not taken directly from the lamp but from the most favorable part of the inner surface of the reflector. The test object was made to match the reading page both in brightness and color value.

The match in color value was secured by means of thin gelatin filters covering all or a part of the aperture. If only

a part of the aperture was covered, the filter was used as a diaphragm with an opening similar in shape to the original aperture. There was, for example, enough difference in the color value of the illuminants that without this match a colored after-effect was given, distinctly different from the reading page. This would have necessitated that the final 3-min. record be taken in part at least with a test object having a coloration complementary to the reading page, which would not have been compatible with the purpose of the test. Before beginning each test of the series, the eye was allowed the customary adaptation period without work under the illumination to be tested. The choice of the length of adaptation period was empirical, based on a series of acuity tests, the object being to determine a period the prolongation of which gave no further change in acuity.

In the first series of tests with the illuminants mentioned above, the ordinary green shade of the student lamp was used. However, as the work progressed, the results seemed to indicate more and more clearly that difference in color value must be added to the list of factors which are considered to affect the power of the eye to sustain clear seeing for a period of work. In fact, as the tests were conducted, color value was the only variable of any magnitude present from series. In any event it was considered advisable to repeat the tests with the color value proper to the illuminant, unmodified by the light which filtered thru the shade, even tho the position of the lamp was such that a very small part of the light which fell on the reading page was of this origin. From this time on, therefore, an opaque shade of the same size and design and with a neutral lining was substituted for the green shade. The results for the neutral shade only will be given in this paper, altho no significant difference in result between the green and the neutral shade was found.

The reading page illuminated by the different lights had the following color values: the "mazda, type B" lamp, an unsaturated reddish yellow; the kerosene flame, reddish yellow with a

greater proportion of red and more saturated; the carbon lamp, reddish yellow with less red than the kerosene flame and more than the "type B" lamp; the "type C" lamp, unsaturated yellow, nearly white; and the "type C-2" lamp, noticeably bluish. These estimates of color value are based in part on a direct comparison, in part on the filters that had to be used, to make the color match between the test object illuminated by the "type B" mazda lamp and the reading page lighted by the illuminant to be tested. We have not as yet made a standard colorimetric or spectrophotometric comparison.

The tests were conducted in a room 16 ft. 6 in. (5.03 m.) long, 11 ft. 9 in. (3.58 m.) wide and 9 ft. 6 in. (2.98 m.) high. A photograph of the room with an observer, lamp and recording apparatus in position is shown in Fig. 1. The recording apparatus and the fixtures for lighting the test object are, it will be noted, screened from the observer's view.

In the selection and use of observers for all of our work care has been exercised in the first place to choose only those who had already shown a satisfactory degree of precision in other work in physiologic optics and whose clinic record showed no uncorrected eye defects of consequence. All have been under 30 years of age. Before being allowed to take part in the actual work of testing, each observer was trained to a satisfactory degree of precision in the 3-min. records under a given lighting condition and in the 3-hour test under several conditions. In the actual work of testing, the results were compiled from a number of observations and the precision was checked up by the size of the mean variation. No results were accepted as significant unless the variation produced by changing the condition to be tested was largely in excess of the mean error or mean variation for each condition tested. This, the accepted check on the influence of variable extraneous factors in work of this kind, was carefully applied at each step in the work. A fuller statement of the precautions that have

TABLE I.

Showing the tendency of the different illuminants used to cause loss of visual efficiency, or power to sustain clear seeing.

Type of Illuminant	Dominant Color	Test object	Brightness (cp. per sq. in.)	Reading page	Time	Working distance (cm.)	Total time clear (sec.)	Total time blurred (sec.)	Total time clear + total time blurred	Ratios reduced to common standard	Loss of efficiency ex- pressed in percent- age change of ratio	Mean variation (per cent.)
Mazda lamp, Type C.....	Unsaturated yellow, nearly white.	0.003168	0.003344		9 A. M.	60	144.27	35.73	4.038	3.50	5.34	0.19
Mazda lamp, Type B, 60 W....	Unsaturated yellow, slightly reddish.	0.003168	0.003344		12 M.	60	142.67	37.33	3.822	3.313	.....	3.58
Mazda lamp, Type B, 15 W....	Unsaturated yellow, slightly reddish.	0.003168	0.003344		9 A. M.	60	139.0	41.0	3.92	3.50	6.86	0.43
Carbon lamp (metallized fila- ment).	Reddish-yellow	0.003168	0.003344		12 M.	60	136.7	43.3	3.157	3.26	.....	6.25
Kerosene flame .....	Orange-Yellow	0.003168	0.003344		9 A. M.	60	138.6	41.4	3.348	3.50	7.11	0.503
Mazda lamp, Type C-2.....	Unsaturated blue ..	0.003168	0.003344		12 M.	60	136.2	43.8	3.11	3.251	.....	4.71
					9 A. M.	60	142.5	37.5	3.80	3.50	7.89	0.371
					12 M.	60	140.0	40.0	3.50	3.224	.....	3.84
					9 A. M.	60	139.17	40.83	3.408	3.50	8.39	0.323
					12 M.	60	136.33	43.67	3.122	3.2063	.....	4.57
					9 A. M.	60	138.75	41.25	3.364	3.50	13.14	0.60
					12 M.	60	134.12	45.88	2.923	3.04	.....	.....

TABLE II.

Showing a comparison of the tendency of the different illuminants used to cause loss of visual efficiency and to produce ocular discomfort. The tendency to produce discomfort is estimated by the time required for just noticeable discomfort to be set up.

Type of Illuminant	Dominant Color	Brilliance (cp. per sq. in.) Reading page	Per cent loss of effi- ciency	Mean variation (per cent)	Time threshold of dis- comfort in seconds (reading)	Mean variation (per cent)	Change produced by changing type of reflector (per cent)
Mazda lamp, Type C.....	Unsaturated yellow, nearly white.....	0.003344	5.34	0.19	116.5	1.30	15.45
Mazda lamp, Type B, 60 W....	Unsaturated yellow, slightly reddish.....	0.003344	6.86	0.43	98.5	1.53	0
Mazda lamp, Type B, 15 W....	Unsaturated yellow, slightly reddish.....	0.003344	7.11	0.503	98.5	0.51	5.58
Carbon lamp (metallized filament).	Reddish-yellow .....	0.003344	7.89	0.371	93.0	0.72	3.23
Kerosene flame .....	Orange-yellow .....	0.003344	8.39	0.323	90.0	1.11	39.44
Mazda lamp, Type C-2.....	Unsaturated blue .....	0.003344	13.14	0.60	54.5	3.70	.....



been used in this and previous work to secure reproducibility of results has been given in various places in preceding papers.<sup>6</sup>

The results for the effect on the eye are given in Table I. The values given in this table are averaged in each case from the results of a number of three hour tests. In order to show the reproducibility of the results obtained and to determine whether the variations produced by the changes in lighting effects are safely in excess of the variations in the test itself, subject to all of the variable factors which may influence it, the mean variation from the average result has been computed in each case. The value of these in per cent is given in columns 12 and 13 in Table I. This value has been estimated in two ways. In column 13 it is based on the result sought, namely, the mean value of the drop in ratio of time seen clear to time seen blurred. Computed in this way the results indicate whether or not each individual determination has been made with an acceptable degree of precision as compared with other work of its class. In column 12 it is based on 3.50, the value of the ratio time clear to time blurred, which has been chosen empirically as the standard of performance of the eye in the 3-min. record before work. Computed in this way, the results appear in a form from which it can readily be determined whether or not the work has been done with a degree of precision which is acceptable for the comparative work which is the special purpose of these experiments. That is, to be

acceptable in this regard, the variations of the drop in ratio caused by changing the conditions to be tested, must in each case be safely in excess of the mean variation. To make this comparison convenient, the drop in ratio and the mean variation have both been estimated in per cent on the same base, 3.50.

In Fig. 2 a graphic representation is made of the results of Table I. In constructing this chart the total length of the test period is plotted along the abscissa and the ratio of the time the test object is seen clear to the time it is seen blurred is plotted along the ordinate. Each numbered division shown along the abscissa represents one hour of the test period; and along the ordinate, an integer of the ratio.

In former papers another method of evaluating the results of the test was employed in addition to the one used above. In this method the ratio of the time seen clear to the total time of the observation is taken as the measure of the eye's ability to sustain clear seeing at the time the test was taken. For the sake of again comparing this method of evaluation with the one used above, a chart has been prepared (omitted from this paper because of lack of space) in which the ratio of time clear to total time of observation is plotted against length of test period. A comparison of this chart with that given in Fig. 2 shows the same order of rating of the illuminants, but a slight difference in the position in the scale given to some of them. For the purpose of discovering what is the best way of treating the

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(1) The data given in this paper were obtained from the observer whose results have been given in the preceding papers on the effect of different conditions of lighting on the eye. In case of the present paper we have not as yet, for lack of time, been able to check up these results with those obtained from other trained observers. We have, however, in the work on the distribution factors always found the results of this observer to be typical of the group of observers used. Whether or not this will be the case for work in which the distribution factors are not the sole or principal variable, remains yet to be determined. In this regard it is perhaps only fair to say that the characteristics of response of the eyes for which these results are given, have been very widely investigated. They have been chosen especially for their normality and practiced precision of behavior, and have been used in these experiments under conditions of control based on a very unusual and widely tested knowledge of the factors which influence their steadiness of response. Data on their characteristics of response may be found in more than forty articles. Their spectral luminosity curve, for example, agrees very closely with the average curve obtained by Nutting for 18 observers.<sup>2</sup>

The results of the above tests are now being checked up on other trained observers.

results of the tests, several methods have been employed. Up to and including the present paper, however, only three of them have been given in print: ratio of time clear to time blurred, ratio of time clear to total time of observation, and the per cent drop in the ratio time clear to time blurred.<sup>1</sup> An ultimate decision with regard to what is the best method of treating the results has not yet been reached and

determinations were made and a discussion of the method that was used has been given in a previous paper. The results are shown in Table II. In this table are given, also, for the sake of comparison, results expressing the tendency of each type of illuminant to cause loss of ability to sustain clear seeing.

The results of this work, so far as it has been carried, more particularly

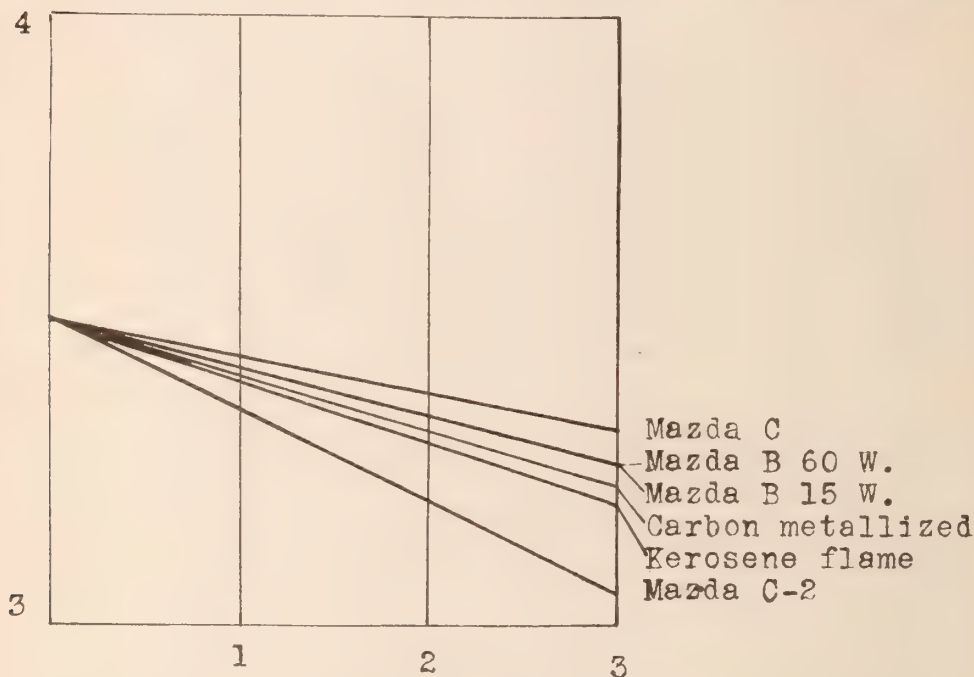


Fig. 2.

Graphic representation of results of Table 1, each numbered division at the bottom represents one hour of the test period. The lines start from the assumed base of 3.5, showing loss in ratio of time clear to time blurred.

for the purposes of this work is perhaps not necessary. From the data given any one of them may be used.

As formerly, the work was concluded by determining for the different illuminants used the relative tendencies to produce ocular discomfort with the eye at work. A description of how the

those to be presented in a later paper which cover a range of color values greater in amount and apparently more significant in direction, seem to indicate that the tests for the effect of color value of light on the power of the eye to sustain clear and comfortable seeing should be carried further. In the work

(1) A comparison of this chart with those of the preceding papers shows that the order of magnitude of loss in power to sustain clear seeing for the kerosene flame and the Type B mazda lamp (student lamp unit), was about the same as for the best of the opaque inverted reflectors (Type B mazda lamp); and for the Type C-2 lamp as for the best of the translucent inverted reflectors. The effect for the Type C mazda lamp was slightly better than for the best of the opaque inverted reflectors.

so far we have found that in case of a given color this power decreases with increase of saturation of color; but that independent of saturation some colors affect the eye more than others. The worst effects thus far have been obtained with colors towards the short wave-length end of the spectrum. The reading of black letters or other characters on a page which presents any considerable degree of coloration is a peculiarly baffling experience. There is an unclearness which is not the blurring of bad focusing or of faulty fixation, but which seems to be a matter

of the ease or, rather, lack of ease, with which the details of the retinal picture are discriminated. Unclearness or difficulty of discrimination from any cause whatsoever leads reflexly to muscular effort towards a corrective readjustment which of course in the cases under consideration comes to naught and only induces fatigue. The effect of color value of light on the power of the eye to hold itself up to a satisfactory standard of performance thru a period of work should, we believe, receive attention.

#### BIBLIOGRAPHY.

1. Ophthalmology, v. 12, p. 593.
2. Annals of Ophthalmology, v. 25, p. 447.
3. Trans. Illuminating Engineering Society, March, 1913, p. 132.
4. Trans. Illuminating Engineering Society, 1915, pp. 1027-1033.
5. Electrical Rev. and W. E., July 24, 1915, p. 161.
6. Trans. Illuminating Engineering Society, 1915, pp. 1122-1130.

#### VERNAL CONJUNCTIVITIS.

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DENVER, COLO.

The report of a typical case followed thru several years, including the histologic examination of excised tissue, with statistics regarding 44 cases and some application of observed facts to diagnosis and treatment. Read before the Third Colorado Ophthalmological Congress, Aug. 10th, 1917.

Vernal conjunctivitis was described by Saemisch as a distinct clinical entity in 1876, and had been noticed by Arlt thirty years before that. Attention was called to it in the American literature by Burnett in 1881, and in 1886,<sup>2</sup> and in 1895<sup>3</sup> Gradle pointed out the frequency and importance of the palpebral form. In 1903 Posey<sup>4</sup> reported a collective investigation regarding this disease in America. It has been well described in every complete text book on ophthalmology published in English in the last twenty years, and occasionally discussed in medical societies. Yet it is a more common condition than is usually appreciated and is often not recognized, but treated as trachoma to the harm rather than the benefit of the patient.

This paper deals with the aspects of the disease which should lead to its recognition and appropriate management. It is based on 44 cases, notes of which have been taken in Denver in the last 15 years. Ten years previous acquaintance with the disease in Philadelphia seems to indicate that it is more common in the dry elevated region of the Western United States.

Let us consider the history of a typical case in detail. The symptoms on which the diagnosis should be based, the differential diagnosis from other conditions, and finally the treatment and the directions in which further study of it seems to promise most.

#### TYPICAL CASE.

CASE 1.—R. B., male, aged 15, was first seen May 25th, 1911. Eyes weak



after measles at 19 months, but recovered. When 7 years old he had adenoids removed, and took whooping cough which lasted from spring to fall. In August the present trouble with his eyes began, diagnosed as simple granulation of the lids. It recovered under treatment, except "a spot the size of a pin head." This was treated with silver nitrat, blue stone and clipped off, but would reappear. Glasses were tried, but discarded. An oculist who saw it in consultation said it was in the nature of a wart.

The boy had previously lived in El Paso, Texas, but in 1907 removed to central California. There he was treated with blue stone and silver nitrat; and glasses were tried again and worn for several months without benefit. Later the electrocautery was resorted to and deep curretting. The diagnosis of trachoma was broached, and tuberculosis also considered. The boy suffered from diphtheria and scarlet fever, which aggravated the trouble. Reports from Dr. Ophuls, the pathologist of the Cooper Institute of Bacteriology were negative for diphtheria or tuberculosis, but another consultant again suggested tuberculosis, and tested for the tuberculin reaction. Papilloma and fibroma were other diagnoses.

At this time one-third of the palpebral surface of the upper lid was occupied by a tumor consisting of firm granulation tissue on the borders, the center being made up of hard tissues like soft cartilage. The greatest thickness of tumor was 3 or 4 mm. The growth was removed and its site treated with silver preparations, until the lids seemed free from granulation tissue. Not long after new growths formed which were more vascular.

At the age of 13 he fell under the care of a San Francisco oculist, who treated him with blue stone and silver nitrat. A year later, under the advice of another oculist of international reputation and experience, the growths were treated with lactic acid for about ten months. Again, to eliminate the possibility of tuberculosis, the pathologist of the Medical Department of the University of California was called in,

found the inoculation of the rabbit proved negative and reported: "The specimen consisted of soft tissue about the size of a pin's head. Fixed in formalin, sectioned in celloidin and stained in hematoxylin and eosin, the preparation gave the following microscopic findings: The preparation is made up of a lobulated mass, the periphery of the separate lobules is composed of epithelial cells, cuboidal in type and arranged in several indefinite layers. The parenchyma of the lobules is composed of fibrous tissue moderately rich in blood vessels. The nuclei in the fibrous element of the parenchyma are spindle-shaped and take the stain deeply, speaking for structure of some age. No evidence of malignancy. Conclusion: Fibroma."

**PRESENT CONDITION.**—All the lids were slightly thickened, the upper drooping. There was no hyperemia on the sclera, no thickening at the limbus. Eversion of the lids showed on the right the nasal third of the palpebral conjunctiva smooth, thickened, quite gray, the remainder covered by a pavement of hard masses, 2 or 3 mm. across, with furrows 1 mm. or more deep between them; somewhat pedicled; worse along the posterior edge of the cartilage, swollen and more separated toward the free margin of the lid. The left lid showed similar masses on the nasal one-third, which were, however, more hyperemic, smaller, and more separated. But all the masses were rather pale and insensitive.

The ophthalmoscope showed the media clear, and ocular fundus normal. Correcting lenses:

Right +2.  $\overline{C}$  —0.75 cy. ax. 100°

Left +1.25  $\overline{C}$  —0.50 cy. ax. 70°

were prescribed of medium amber glass for constant use. Under cocain two-thirds of the granulations, all the larger ones, were removed with scissors, without pain. Immediately the thick, ropy, yellowish discharge diminished, and the eyes became more comfortable. He was placed on

Tannic acid .....grains 3  
Glycerin .....grains 30  
Aqua rosae.....one fluid oz.

To be used 5 drops in each eye twice daily.

He continued the use of his eyes in school with comfort and gradual improvement.

1917-5-16. He returned feeling that his glasses no longer fitted. He had been studying hard at the university during the past year, including Latin and Greek. Upon everting the upper lids a few masses 1 to 3 mm. in diameter were found under each upper lid, and were snipped away. Next day the eyes were entirely comfortable and free from hyperemia except at the edge of wound of excision. He was given correcting lenses of dark Crookes' glass for outdoor use, and light for indoors. His correcting lenses were:

Right  $+1.75 \text{ } \overline{\text{C}} -2$ . cy. axis  $100^\circ$

Left  $+1.75 \text{ } \overline{\text{C}} -1$ . cy. axis  $82^\circ$

These gave vision of 1.3.

The excised masses were submitted to Dr. Wm. C. Finnoff, whose subjoined report may be compared with that of Dr. Lee above quoted, regarding the specimen examined seven years before.

"Three small plaques from the conjunctiva were submitted for examination, and were fixed in formalin, specimens were embedded in cellodin and stained with hematoxylin and eosin and with von Gieson's stain.

"Microscopic examination.—The surface of the plaques is covered with from one to five layers of epithelial cells. Fingerlike processes, lined with two or three layers of epithelial cells, extend down between the papillae.

"The epithelial covering of some of the papillae is thinned to one layer. Covering the thin epithelium is an exudate of fibrin in which are enmeshed numerous eosinophilic leucocytes, degenerated epithelial cells, polymorphonuclear leucocytes, and lymphocytes.

"In the stroma of the papillae there are small spindle shaped and large oval fibroblasts plasma cells, lymphocytes, polymorphonuclear leucocytes and numerous eosinophiles. The fibrous tissue in some areas makes a very thick, dense membrane for the epithelial cells to rest upon. In this connective tissue several eosinophiles can be seen.

"Several sections contain lymph follicles just under the epithelium of one of the papillae.

"The stroma of the papillae becomes more dense as the base is examined, and in one of the sections the base of the specimen contains a well developed connective tissue core."

This case illustrates rather fully the uncertainty regarding the diagnosis of this condition, on the part of ophthalmologists. Ten of them and two pathologists failed to relieve the patient either of uncertainty as to the nature of his trouble, or the burdensome and useless treatment. And it emphasizes the fact that severe and burdensome treatment is useless. During the six years this patient has been under observation without other treatment than the mild collyria and tinted glasses, he has been much more comfortable; and has completed his work in high school and two years of college, with gradual improvement of the condition of his eyes.

#### SYMPTOMS:

Of individual symptoms the *pericorneal hypertrophy* first attracted attention in this country, giving its title to the article of Burnett. It is not constant. In a few cases it is very striking, forming a thick mass unmistakably pathologic, and sometimes extending entirely around the cornea. More often it only involves part of the limbus, the temporal or the nasal portion by preference; but sometimes involves other parts even tho the temporal and nasal regions are free from it.

It becomes hyperemic and thicker during the warm part of the year; but if at all marked it disappears very slowly. It is composed of dense opaque fibrous tissue, as well as thickened epithelium; and has a slightly wavy or irregular inner border rising abruptly from the cornea. This kind of thickening was present in 14 of the 23 cases that showed lesions of the eyeball. It was first emphasized and studied by Raymond.<sup>5</sup>

The cornea itself is rarely involved, but in two of my cases this occurred.

CASE 2.—J. R. P., male, aged 20, has for 10 or 12 years suffered from sore

eyes, that grow worse each year in the spring. Severe hyperemia of the eyeball without much thickening of the limbus. In the lower half of each cornea is a semicircle of moderate opacity affecting the region usually involved in arcus senilis. The opacity is about 2 mm. wide, and separated from the scleral margin by a strip of clear cornea  $\frac{1}{2}$  to 1 mm. wide. The upper halves of the corneas are clear. The opacity is seated in the corneal parenchyma. This patient was seen but twice.

CASE 3.—H. C. E., male, aged 32, was first seen 1905-4-8, suffering from "hay fever eyes," complaining "strings of matter form under the upper lids, and scratch and irritate the eyes, which feel better on cloudy days." There was hyperemia of the bulbar conjunctiva, as well as involvement of the lid portion, showing the usual skim milk film, enlarged papillae and a few large flat growths. He was seen from time to time, always between April and September, the eyes giving no trouble the rest of the year.

1915-9-3. He had suffered especially for three weeks, complaining of the burning, the redness and "the stringy stuff." His sight had been affected, getting a little worse each year for the last few years. Vision with correcting glasses is R. 0.3; L. 0.66. It is always cleared up by December. The corneal reflex is found irregular. The cornea hazy. There is moderate pericorneal hyperemia, and pavementlike thickening of the whole palpebral conjunctiva.

1915-9-9. Vision is as before, roughening of the corneal surface more marked. No staining with fluorescein.

9-15. He was slightly better. Vision, right 0.5; L. 0.7. Under use of adrenalin and an ointment of salicylic acid, 1:120.

9-21. The first frost of the season occurred this morning. Vision R. 0.7; L. 0.9. Eyes are much more comfortable. Can see to read the paper, the first time for three weeks. Cornea smooth and clear, thickening of the palpebral conjunctiva rather less.

9-29. Lids still smoother.

10-18. Corrected vision R. 1.2; L. 1.2.

Lids almost smooth and normal. Eyes quite comfortable.

More frequent than the above, being seen in 23 of the 44 cases, is a temporary *hyperemia of the bulbar conjunctiva* when not accompanied by thickening. This was only seen during the warmer parts of the year, and was often developed chiefly after rubbing the eyes. In many cases the bloodshot appearance was most complained of.

CASE 4.—F. B. D., a Pullman car conductor, carried in his pocket a bottle of adrenalin solution to use several times a day to control this symptom; and other patients have resorted to adrenalin to make their eyes presentable for special occasions.

*Hyperemia of the palpebral conjunctiva* is present in the majority of cases, and is always found in those of recent origin. In the more severe and chronic cases it may be absent, or masked by other changes in the lid. It tends at first to be uniform over the whole inner surface of the lid, and to a slightly purplish red color.

The *gray film* on the palpebral conjunctiva, which has often been compared to a thin layer of milk upon the surface, was first emphasized and described in detail from Horner's Clinic by Vestch" (Inaug. Dis. Zurich, 1879). It varies from an unmistakable hiding of the deeper tissues to the slightest veiling perceptible against a uniform rather purplish background of hyperemia. It is not constantly present, according to my experience, and was noted in but 17 of my cases.

*Roughening of the inner surface of the lids* was present in but 28 of the 44 cases. It is of two kinds. More common, is slight irregularity such as might be due to slightly enlarged papillae, and which I note as "papillary." In the second form we find larger protruding masses often with a contracted neck or pedicle, which have sometimes been compared to the circumvallate papillae of the tongue, and sometimes to a cobblestone pavement. When very numerous these become irregularly hexagonal by mutual pressure. They are of slow development, may continue with little change from year to year, and are of firm consistence. They are



never soft and dark-red like the masses sometimes seen late in gonococcus ophthalmia; but rather pale yellowish, and of even cartilaginous consistence. Such granulations were present in 14 cases. They may remain but little altered for many years, and cases presenting them have generally been regarded by some who treated them as cases of trachoma.

Noticeable *discharge* is not always present; but it is often a persistent and most annoying symptom. It was noticed in 14 cases, generally when there were large masses of hypertrophy on the palpebral conjunctiva. It is described as stringy, adhesive, always consistent, sometimes even cheesy, masses. Rarely, if ever, is it thin and watery. It may be almost colorless, but is more often a yellowish white color.

The *subjective symptoms* are generally slight and unimportant except the form of irritation that is usually described as itching, and often causes a strong inclination to rub the lids. Itching was especially noted in 19 cases.

The annoyance from the strings of discharge which form and are difficult to get rid of, is a frequent cause of complaint. *Photophobia* may be annoying, but sometimes is not noticed. But the eyes feel "weak" and there is a strong disposition to avoid their use.

Two points that have an important bearing on the diagnosis are the *season of the year* at which the attacks appear, or become aggravated; and the *age of the patient*. With reference to the seasonal prevalence of the disease, my cases first applied for relief as follows:

January . . . . . 1	July . . . . . 3
February . . . . . 1	August . . . . . 5
March . . . . . 5	September . . . . . 5
April . . . . . 6	October . . . . . 4
May . . . . . 5	November . . . . . 0
June . . . . . 9	December . . . . . 0

The patient seen in January was not suffering at the time, but said that for many years his "eyes had looked like a beefsteak from August until frost." The patient seen in February had suffered from the trouble for years; and like some of those seen in March, sought to forestall a new attack. Of the patients seen in October, 2 had suffered from the

trouble for years, and 2 had been much worse during the spring and summer. No case seemed to arise between September and March.

As to *sex*, I find that 25 of the patients were males, 19 females, a preponderance of the former that might easily be accounted for by more general exposure to light and dust.

With reference to the *age* of the patients: At the time of the first attack the best obtainable history indicated that it was:

Under 5 years . . . . .	3
5 to 10 years . . . . .	15
10 to 20 years . . . . .	13
20 to 30 years . . . . .	9
30 to 40 years . . . . .	2

The following case indicates that it is possible for the disease to start late in life, altho such an occurrence must be very rare.

CASE 5.—Mrs. S. A. A., aged 75, was first seen for incipient nuclear cataract, which still permitted corrected vision of Right 0.7 and Left 1. She gave no history of previous symptoms of vernal conjunctivitis; but presented papillary granulations of the palpebral conjunctiva, covering a portion of each upper lid. These appeared in August, with hyperemia and feeling of a foreign body. The larger masses were yellowish in color. The irritation occurred three successive summers. There was no involvement of the region of the limbus.

The repetition of the attack or exacerbation each summer commonly goes on for several years. Only eight of these patients were seen in the year of the first attack. Most of them were not cured when last seen, but when last seen the attacks had continued to recur:

Less than 5 years . . . . .	19
5 to 10 years . . . . .	13
10 to 15 years . . . . .	4
15 to 20 years . . . . .	6
Over 20 years . . . . .	2

#### DIAGNOSIS.

Most cases of vernal conjunctivitis have at some time been mistaken for trachoma, and trachoma is such a varied, multiform disease that there is reason for liability to this error. Both trachoma and vernal conjunctivitis are inflamma-

tions affecting the conjunctivas of the lids and globe, and running a course measured in years. Both are marked by swellings spoken of as "granulations" on the palpebral conjunctiva, and possible extensions of the lesions on to the cornea. But with these points of similarity there are others of essential difference that will lead to a correct diagnosis if they are borne in mind and looked for.

Trachoma begins insidiously, becoming manifest at any time of year. Vernal conjunctivitis begins with a fairly distinct exacerbation in the spring or during hot weather. The relapses or recurrences of trachoma arise at any season, following ordinary conjunctival irritants. Those of vernal conjunctivitis are closely related to warm weather. The granulations of trachoma are deeply situated in the conjunctiva, or beneath it in the deeper tissues. Those of vernal conjunctivitis arise on the surface, and extend out from the normal surface, being often slightly pedicled. In trachoma they are apt to involve the retrotarsal folds. In vernal conjunctivitis they are almost exclusively situated on the tarsal portion of the upper lid, being most developed near the posterior edge of the tarsus. The skim milk film of vernal conjunctivitis is not seen on the lids in trachoma, nor are the scarred lids, or altered tarsus of trachoma seen in vernal conjunctivitis, unless caused by improper treatment.

In vernal conjunctivitis the involvement at the corneal margin consists in a thickening of the limbus, most likely to be marked at the temporal or nasal portion. If other parts of the cornea are involved they present slight irregularity of surface, and nonvascular general haziness. In trachoma the usual corneal lesion is a clouding and superficial vascularity affecting the upper and lower portions of the cornea, these come most constantly in contact with the lids.

In trachoma the discharge is proportioned to the acuteness of the process, or depends on intercurrent inflammations. In vernal conjunctivitis the discharge is proportioned to the size of the granulations and has a peculiar character. It is stringy, ropy, even almost cheesy in consistence, rather than purulent. In trachoma microscopic examinations may

show the inclusion bodies, or the microorganisms of various forms of infectious conjunctivitis. In vernal conjunctivitis overgrowth of epithelium sometimes arranged like a papilloma, and increase of eosinophiles are the characteristic changes.

As to confusion with other conditions, such as tuberculous conjunctivitis, Parinaud's conjunctivitis, chronic diplobacillus conjunctivitis, etc., any mistake of diagnosis will be easily avoided if the clinical characteristics of vernal conjunctivitis are borne in mind and the history of the case is considered.

#### TREATMENT.

The correct diagnosis of vernal conjunctivitis is of practical importance because of the totally different line of treatment that should be pursued for it, from what is commonly required for trachoma, or the other conditions with which it is likely to be confused. For the latter painful and irritating applications and serious operations are appropriate. But for vernal conjunctivitis the only operative treatment indicated is the excision of any large masses found on the tarsal conjunctiva of the upper lid.

Local applications should generally be relatively mild or soothing. Solutions of tannin or ichthyol, one per cent or less; one per cent ointment of the yellow oxid of mercury, solutions of boric acid 3 per cent; sodium hyposulphit or potassium chlorat, one per cent or less, or quite weak solutions of adrenalin, are to be used. These relatively mild applications contribute to the comfort of the patient and do quite as much toward shortening the course of the disease as any more active and painful line of treatment.

Probably for a radical cure, where such treatment is available, repeated exposures to the Roentgen-ray, or to radium, are our most valuable therapeutic measures. With reference to the latter Allport<sup>7</sup> states that of at least fifteen cases treated with X-ray exposures in a dozen years "they have all been cured, that is, all who have carried the treatment thru to the end."

Butler<sup>8</sup> has obtained equally conclusive results through applications of radium and Mackenzie-Davidson, who applied

the treatment for him, stated that "all of the cases which he had treated thus had been completely cured."

For prophylaxis or the prevention of recurrences, residence in a cool, moist climate during the hot portion of the year has proven reliable. Such a climate is

found on the coast of Maine, among the lakes of Canada and the northern United States, and in the region of Puget Sound or Alaska. It may be found in some mountain climates, but apparently it is quite as important to avoid dryness of the atmosphere as to avoid heat.

#### BIBLIOGRAPHY.

1. Burnett. Archives of Ophthalmology, v. 10, p. 414.
2. Gradle. Amer. Jour. Med. Sc., v. 91, p. 478.
3. Gradle. Archives of Ophthalmology, v. 24, p. 466.
4. Posey. Trans. Sec. on Ophth. A. M. A., 1903, p. 12.
5. Reymond. Annali di Ottalmologia, v. 4.
6. Vetsch. Inaug. Diss. Zurich, 1879.
7. Allport. Ophthalmic Record, v. 26, p. 395.
8. Butler. La Clinique Ophthalmologique, v. 21, p. 469.

#### DISCUSSION.

Dr. W. A. SEDWICK, of Denver, demonstrated three cases of vernal conjunctivitis. The first was a boy of thirteen years who had had more or less trouble for six years, but had become a great deal worse two years ago. The condition came on in the spring, with itching, burning and redness. It was a little better in the middle of the summer and still better in the winter. Little benefit had resulted from treatment until copper sulphat was used; since then there had been marked improvement. The second case was in a boy of ten years, whose first complaint had been three years earlier following an attack of measles. The condition had started in the late winter, was better in the summer following treatment, but always considerably better in the winter. There were large granulations inside the upper lid at the inner canthus. A third case of similar character was also shown.

Discussion—Frank R. Spencer, Boulder, Colorado, said that it seemed to him there had been an epidemic of vernal conjunctivitis this summer. He had seen three or four times as many cases as in previous summers. He called attention to a paper by Allport in the Ophthalmic Record, v. 26, p. 395, on the use of X-ray treatment.

Harold Gifford, Omaha, Nebraska, said that in a personal communication, Allport had stated that of late he had been using radium instead of the X-ray, and had been getting just as good results with less trouble.

So far as Dr. Gifford knew, there had not been any previous report of acute vernal conjunctivitis starting in adult life; but he had seen one case in which during the fearfully hot summer of 1901, a middle aged woman suddenly developed all the symptoms of vernal catarrh, including a typical waxy tarsal conjunctiva, with much sensitiveness to heat, the condition persisting during the summer and disappearing with

the advent of cool weather. It was possible that this might have been a latent case of long standing, stirred up by the heat, instead of a new case. During the same summer, he had seen two other cases in adults, which ordinarily would have been called fresh cases; but he happened to have treated both of them many years before for mild vernal catarrh, which was apparently cured by adrenalin. During intervening years, they had no trouble whatever, but the unusual heat of 1901 stirred up the old symptoms with increased vigor.

Melville Black, Denver, would like to ask how many of the men present thought that the condition of the eyelids of the older boy warranted a diagnosis of vernal conjunctivitis. Some of these cases were just as bad in the winter as in the summer. The boy had improved under the use of bluestone, but it was far from being a typical case of trachoma.

Marcus Feingold, New Orleans.—The older boy presents the typical picture of vernal conjunctivitis, but in the histologic picture in the portion examined by Dr. Finnoff the usual dipping down of the thickened epithelium so characteristic of the disease is missing. If unusual heat were to be the cause of this conjunctivitis, as has been asserted, New Orleans with its long summer should show a great deal of vernal conjunctivitis, but it is characteristic of our city that no vernal conjunctivitis is seen, or only in abortive cases. About four years ago Bayer of Freiburg, reported experiments in which he hermetically closed the eyes by transparent glass or celluloid capsules; these allowed light to pass thru but prevented the access of air. In all experiments the patient experienced relief from the subjective symptoms. I repeated the experiment in two cases of the abortive type, as seen with us, with the very gratifying results that the subjective symptoms of itching and irritation disappeared while, of course, the objective symptoms remained unchanged.



H. H. Stark, El Paso, Texas. If heat and dryness produce vernal catarrh, there ought to be plenty of it in El Paso, Texas, but Dr. Stark had never seen a true case develop in El Paso. They did have at times a development of thickened conjunctiva opposite the palpebral fissure, but never the pavement formation.

E. N. Robertson, Concordia, Kansas. In our section (north central Kansas), as many of you know, it is not uncommon for the thermometer to hover around 100 to 105 degrees in the shade, continuously during the greater part of July and August, and during the last ten years, the only summer I do not recall having seen a new case of vernal catarrh was during the season of 1915, when it was very wet and cool from May to October. I have naturally, therefore, been led to associate this disease exclusively with the hot, dry weather. That it does occur in the cooler and damper climates cannot be denied, but I understand the type of the disease differs. It is said that in England and northern France, the tarsal type is prevalent, while in Italy and Mediterranean countries, the bulbar form is more common.

I take it there must be some form of hypertrophy, either on the ocular or palpebral conjunctiva, to make a typical case of vernal conjunctivitis. In practically all of the cases which I have been privileged to see, the so-called bulbar type has predominated, the jelly like band being present around the cornea with but slight, if any, thickening or hypertrophies of the tarsal conjunctiva. The extreme form of hypertrophy with large granulated bodies on the tarsal conjunctiva, such as were exhibited here today, I have never seen, although I remember examining cases of the tarsal variety in Omaha, while associated with Dr. Gifford some ten years ago.

In this connection, I wish to report a case diagnosed on my records as vernal catarrh, a typical form which for several years had been causing a charming young lady considerable grief during the spring and summer only. The itching, burning photophobia, lacrimation, and hyperemia started during the spring of 1911 and 1912, when the patient was about twelve years of age. It was a couple of years later, when she first consulted me. The objective symptoms at that time consisted of a slight ptosis, hyperemia, and mucous discharge. There were no hypertrophies on either the ocular or pal-

pebral conjunctiva, the bluish white film could always be seen over the upper tarsal conjunctiva, and about once a day, beginning with hot weather, portions of a pseudomembrane would be cast off from the conjunctiva, and have to be swabbed from the conjunctival sac by the patient. If picked off during treatment, a raw surface would sometimes be left. The conjunctiva was not perceptibly thickened, as I recall. Microscopic examination of smears from the conjunctiva and mucous discharge revealed no specific organisms.

After seeing me a few times and being informed of the nature and course of the disease, the young lady was taken the following spring to the Mayo Clinic, where her condition was diagnosed as tuberculosis of the conjunctiva. After six weeks of anti-tuberculous treatment, she returned home unbenefited by her stay at Rochester. She was then referred to Dr. Gifford, who confirmed the diagnosis of vernal catarrh, a typical form.

It may be of further interest to note that the young lady, now past eighteen years of age, returned to see me recently since the hot weather, with almost complete cessation of her eye symptoms, objective and subjective, except for a slight sleepy look in her eyes. The only treatment prescribed by both Dr. Gifford and myself was weak solutions of cocain and adrenalin, and cold applications.

Otis Orendorff, Canon City, Colorado, had been treating a case of vernal catarrh in which there was hay fever. The eye condition came and left with the hay fever, altho the eye condition was a typical vernal conjunctivitis.

W. A. Sedwick thought that if the case were one of trachoma, there would probably have been found some inclusion bodies and also pannus. The lids of his first case became entirely smooth afterward under local applications of fibrolysin.

C. A. Ringle, Greeley, Colorado, referred briefly to statements made by various writers on the subject of vernal conjunctivitis.

John A. McCaw, Denver, Colorado, did not believe that it was very easy to differentiate vernal conjunctivitis in certain stages from trachoma. In one of the cases presented, there had been a number of granulations almost typical of trachoma.

# CONTRIBUTION TO THE KNOWLEDGE OF KERATITIS DISCIFORMIS

L. H. WAGNER.

AMSTERDAM.

A doctorate thesis, translated in abstract from the original Dutch, by Edmond E. Blaauw, M. D., of Buffalo.

The historical development of our knowledge of keratitis disciformis, which was given its name by Fuchs, although long known and named by v. Arlt "abscessus siccus," is traced by Wagner. E. von Hippel and Peters each described the development as they saw it, formulating a theory. Wagner gives the clinical histories of 16 cases, which had been treated in Straub's clinic since 1901. He relates three cases, with all the typical earmarks of the disease, which healed in a relatively short time with a remaining more or less distinct leucoma.

Case 13, examined histologically, is that of a man 77 years old, who was admitted to the hospital on the third day of May, 1909, with a very inflamed eye. He being practically deaf will account for the absence of an anamnesis. R. a strong injection, limbus much swollen, especially upward, and goes too far over the cornea. Below, a small grayish corneal sickle borders the pushed-forward limbus. Upward where the limbus tumefaction is most pronounced, a large crescentic marginal ulcer, staining with fluorescein, is seen. The largest part of the corneal center looks dull, somewhat fatty, and does not stain with fluorescein. The center is yellowish white, sharply limited; and the opacity seems to be in the corneal substance, while a much larger grayish opacity, still deeper, surrounds this. Only at the nasal side a connection between the large marginal ulcer and the deep central disc exists. Tension normal. Hardly light perception. A puncture in the lateral upward part does not evacuate a hypopyon.

The condition did not become better and the patient suffered much pain. On May 7th enucleation. The hypopyon had increased. Cultures from this gave a few colonies of staphylococcus pyogenes albus. Three days later a

rabbit's cornea was infected with a superficial and deep stab. The superficial developed to a white superficial ulcer, the deep stab produced a deep opacity in the cornea, from where fibrin precipitated at the posterior surface of the cornea and at the margin of the iris.

The hardened eye was sectioned sagittally. The conjunctiva bulbi is everywhere much thickened and infiltrated with masses of lymphocytes. This infiltration is especially pronounced in the region of the corneal limbus. The cornea is without epithelium as far as it is not covered by conjunctiva. At the upper part where the conjunctival epithelium stops suddenly, the lower side of this conjunctival prominence is without epithelium. This points to an ulceration between cornea and conjunctiva, of which the marginal ulcer described in the case history is a part. Here the conjunctiva is as thick as the cornea below, and much infiltrated with lymphocytes; the vessels are enlarged, crowded with red blood cells, and more numerous than normally.

At the lower part the conjunctiva is even more pushed out, and is also thickened and infiltrated. When the corneal epithelium reaches the place where it is not covered by overhanging conjunctiva, it becomes detached from Bowman's membrane, and is seen as a thin, loose epithelial flap. At its beginning thick, the epithelial layer of the conjunctiva becomes gradually thinner, until it consists of only two or three layers at its transition into the corneal epithelium, which remains of a similar inferior quality.

The corneal-conjunctival ulcer has caused more destruction at the temporal side, so that here large crypts are found in the conjunctiva, formed thru destruction of cells. These

are filled with free lymphocytes and some epithelial cells.

The cornea has become thinner, especially in its upper half, which has a thickness of 0.4 mm. The surface is uneven and shows three depressions; one in the center, one just above this, and one just below the superior conjunctival border. The upper four-fifths of the cornea are without epithelium. In the lowest fifth, the epithelium consists of two or three layers of degenerated cells. These lie irregularly and have an abnormal shape. Bowman's membrane is present with the exception of the upper fifth, the seat of the ulceration of the cornea and conjunctiva. With weak magnification, the parenchyma shows two parts: A posterior part poor in nuclei, and an anterior part rich in nuclear elements. The posterior part suggests a total necrosis. The boundary of these two zones lies about in the middle corneal layers. The part poor in nuclei forms a disc, which is limited sharply forward and backward. Upward and downward the disc goes over into more normal cornea. The transition is quicker in the upper part. The transition is gradual at the nasal and temporal side, and quicker at the nasal side.

The disc, poor in nuclei, lies paracentrally to the nasal side and upward; and has the size of about two-thirds of the entire cornea. The membrane of Descemet forms the posterior of limitation, so far as it is present. Where it is absent, polynuclear leucocytes lie directly against the nuclei-free parenchyma. The necrotic disc contains, in a few spots, a normal or a degenerated corneal cell; and here and there in a slit, a small row of partly normal, partly degenerated lymphocytes. Hematin colors the disc slightly blue, which may demonstrate some dissolved nuclear substance in the corneal slits. The corneal fibers in the disc can be recognized as such; they are thinner and shorter than normal. Where the transition to living cornea happens, the fibers become thicker and the waving is stronger. The anterior layer, characterized by a large number of nuclei, contains nuclei more or less degenerated, just

before passing into the necrotic disc. The surrounding parenchyma shows a large increase of normal corneal corpuscles, in contradistinction to the surroundings of the necrotic disc, where the increase is far less excessive. Any sign of connective tissue formation is absent here.

Over a small extent, the necrotic disc lies against a thin layer with wide, intensive blue slits, filled with nuclear remnants, surrounded by a few more or less changed lymphocytes, directly against Descemet's membrane. Those lymphocytes which lie directly against the membrane show the least changes. The anterior corneal layer, characterized by more cells and local conglomeration of lymphocytes and enormous decay of cells and nuclei in its most forward part, does not represent the entire original anterior half of the cornea. The most forward corneal layers have been destroyed, in some parts entirely. The largest defect is in the upper part of the cornea. About 3 mm. lower a similar defect exists. In the margins of these defects a number of young connective tissue cells are found.

Recapitulating, we see that the necrotic disc is limited, forward by a fairly strong infiltrated tissue, with numerous killed lymphocytes; backward partly by a similar infiltrated tissue, partly by the membrane of Descemet, partly by an agglomeration of polynuclear leucocytes, and toward the sides by living corneal tissue, which shows a moderate increase of its normal nuclear elements. Descemet's membrane is absent for about the fourth part of the corneal center. For nearly its entire extent, a single layer of lymphocytes is found between it and the corneal parenchyma. The endothelium is nowhere present in normal condition. It is entirely absent or it is much proliferated. Spots are found where the endothelial cells are irregularly dispersed on the membrane; polynuclear leucocytes and some lymphocytes lie between these.

In other places the endothelial cells are entirely free from the membrane and sometimes at a little distance away; they then have proliferated in



the fibrinous hypopyon, strongly infiltrated with polynuclear leucocytes, which covers the posterior wall of the cornea. They show a strong inclination to proliferation, which goes sometimes so far that true giant cells are formed. Quite a number of these giant cells are present.

**Anterior Chamber and Iris.** The fibrinous hypopyon covers the entire posterior surface of the cornea, and lies on the iris, the pupil remaining free. It is formed by fibrin and polynuclear leucocytes with here and there a lymphocyte. A number of large phagocytes lie in the angle of the anterior chamber, and in some places also against the posterior surface of the cornea. About both arterial circles of the

iris, a strong lymphocytic infiltration is seen. The surface of the iris is also much infiltrated. Some polynuclear leucocytes have penetrated the iris tissue. These two layers, the lymphocytes in the iris and the leucocytes on the iris, are fairly sharply separated.

In the other parts of the eye, there are no changes. Only in the optic nerve a distinct beginning of the formation of Schnabel's caverns exists. Wagner comes to the conclusion that the disciform keratitis is characterized by a dislike part of strongly altered corneal tissue, lying deep; caused by toxins, produced by microorganisms existing in the epithelium. These have not yet been discovered, but their presence we can surmise with great probability.

## THE PROBLEM OF IMMEDIATE ENUCLEATION.

(Sul problema dell' enucleazione immediata)

PROF. A. ANGELUCCI.

NAPLES, ITALY.

Abstract translation from *Archivio di Ottalmologia*, 1917, p. 159, by William H. Crisp, M. D.

Basing their faith on the German statistics of the war of 1870, the French surgeons had for many years relied absolutely upon enucleation. According to these statistics, the wounded eye damages the sound eye sixty times in every hundred. But the Germans had included in their statistics all the cases of reflex traumatic neurosis. Gradually the statistics of true sympathetic ophthalmia in the sound eye were reduced to seven per thousand. That the Italians resort somewhat sparingly to enucleation is indicated by the fact that of about six hundred wounded who were received in Angelucci's eye clinic, only seventy-seven had one eye enucleated. Of five hundred and ten wounded eyes he personally was only obliged to enucleate thirty-eight; three times only, blind eyes were enucleated to relieve the sound eye of a reflex neurosis which rendered it irritable to light.

On the Carso wounds of the eyes represented 1.8 per cent of general wounds, so that it is important to es-

tablish a clear policy in the problem of enucleation. The ophthalmia which passes to the sound eye is today extremely rare, develops ordinarily after the second week, and the wounded eye has already assumed a quite familiar menacing aspect. After eight weeks from the wound, the danger is almost passed. Thus no circumstance renders enucleation urgent except in eyes smashed by the wound, deformed or afflicted by infective processes.

Does enucleation completely guard against the danger from sympathetic ophthalmia which we fear? Schieck relates eight cases which have occurred to him in this war period. Now in four of these cases the wounded eye had been removed when the other eye was completely healthy. Enucleation does not therefore possess an absolutely preventive action, although it may be remarked that in Schieck's cases the ophthalmia which followed was of benign evolution. Dimmer and Peters ask the question whether the extreme rarity of

sympathetic ophthalmia after military wounds is related to the terrain? If better in the soldier, it favors the supposition that sympathetic ophthalmia is facilitated by processes, toxic and infective in their course.

The only case of sympathetic ophthalmia observed by Angelucci harmonizes with these clinical beliefs. The left eye of a young officer was enucleated two days after the wound, and after the third week he became aware of the first symptoms of visual deficiency, especially in the upper sector of the visual field. While at home on leave of absence there was an alternation of deterioration and improvement; after four months he could hardly find his way about. He came to the clinic with the stump extremely painful beneath the glass eye. After the iridochoroidal symptoms had almost disappeared from the right eye, the visual field and the ophthalmoscopic appearance revealed a classic process of retrobulbar neuritis, the papilla was whitish and slightly obscured, the arterial vessels very slender, and some of the veins markedly congested. After urgent removal of the painful cicatricial stump, and under endovenous injections of sublimat in one per cent solution, iodine of arsenic and of strychnin, the vision rose in a short time to 7/10.

(There was however a suspicion of syphilis.)

Sympathetic ophthalmia has been known to arise after operations for traumatic cataract. Valude relates a case operated upon for cataract two months after the injury; the operation was followed by iridocyclitis and by a fatal sympathetic process in the sound eye. Morax has observed only one case of sympathetic ophthalmia in fifteen hundred wounded soldiers, and this case followed cataract extraction done two weeks after the injury. In this case, however, the iris prolapsed through the operative wound. Caution of the prolapsed part was resorted to with the galvanocautery, and ten days later a serious sympathetic process involved the sound eye.

Angelucci urges that in every case a careful study should be made before deciding to remove the injured eye. He refers to some personal cases in which, altho in earlier times the eyes would have been removed on account of penetrating injuries, removal was not resorted to but the eyes were preserved with a perfectly normal aspect; and to other cases in which fairly useful vision was retained in eyes which some surgeons might have decided to remove.

## DISTURBANCES OF VISION BY CEREBRAL LESIONS.

LT. COL. GORDON M. HOLMES, R. A. M. C.

LONDON.

Abstracted from the Medical Press, December 26th, 1917, by Charles H. May, M. D.

The writer has presented a very instructive paper based on exhaustive researches carried out in the hospitals of France—a sequel to the article of 18 months ago on "Disturbances of Vision Produced by Gunshot Injuries of the Visual Cortex and of the Optic Radiations," written in conjunction with Colonel Lister (see p. 191). He gives the conclusions arrived at in the former paper relating to the cortical representations of the retina, and the seg-

mental correspondence of different areas of the retina with separate zones of the cortical visual area. These agreed with those already arrived at by Inouye from a study of cases in the Russo-Japanese war, and by others; and are now strengthened by many observations made by Holmes since presenting his first article.

The most interesting local defects in the fields of vision are central and paracentral scotomata, which are very

common in all moderate injuries of the occipital lobes. Injury of the poles of both hemispheres may cause complete loss of central vision. An unilateral wound produces homonymous scotomata in the opposite halves of the fields. A common type of case is that of pure lateral paracentral scotoma, as a result of a penetrating wound of the skull of the opposite side.

The writer discusses the nature of the lesions, taking up first, concussion. When the visual defects persist for a considerable time, they are due to a simple destructive lesion. Quick recovery probably depends upon the existence of an edematous swelling of the areas concerned, analogous to that which is seen in the myelin sheaths of the spinal cord. Next follows a discussion of the mechanism and function of peripheral vision and disturbance of color perception caused by cerebral lesions. Holmes considers that it has not been conclusively shown that color perception may be completely lost in any part of the field, when that of light or white is undisturbed; many of the hemiachromatopsias have been instances of hemiamblyopia. He had frequently observed among his cases that red and green test objects could not be recognized in certain regions, often in homonymous halves of the visual fields. But in every instance visual sensibility to white test objects of the same size was reduced; his observations led him to the conclusion that an isolated loss or dissociation of color vision is not produced by cerebral lesions.

The paper includes a discussion of disturbances of visual attention and loss of visual orientation and appreciation of depth; and concludes with the following summary, which is offered at least as a working hypothesis for further investigations:

1. The upper half of each retina is represented in the dorsal, and the lower in the ventral part of each visual area.

2. The center for macular or central vision lies in the most posterior part of the visual areas, probably on the margins, and in the lateral surfaces of the occipital poles. The macula has not a bilateral representation.

3. The center for vision subserved by the periphery of the retina is situated in the anterior portions of the visual areas, and the serial concentric zones of the retina from the macula to the periphery are probably represented in this order from behind forwards in the visual areas.

4. Those portions of the retinas adjoining their vertical axes are probably represented in dorsal and ventral margins of the visual areas; while that in the neighborhood of the horizontal axes is projected on to the walls and the floor of the calcarine fissures.

Severe lesions of the visual cortex produce complete blindness in the corresponding portions of the visual fields, or, if complete, an amblyopia, color vision being generally lost, and white objects appearing indistinct; or only more potent stimuli, such as objects moved sharply, may excite sensations.

6. The defects of vision in the fields of the two eyes are always congruous and superimposable, provided that no disease or injury of the peripheral visual apparatus exists.

7. Lesions of the lateral surfaces of the hemispheres, particularly of the posterior parietal regions, may cause certain disturbances of the higher visual sensibility, as loss of visual orientation and localization in space, disturbance of the perception of depth and distance, visual attention loss, and visual agnosia.



## SHORT ABSTRACTS.

Under this heading only points of the greatest importance will be noticed. For the systematic review of the literature see "Digest of the Literature," a part of which appears each month.

**Foster, M. H.—The Clinical Course and the Diagnosis of Trachoma.** (Journal American Medical Association, December 1st, 1917.)

This interesting article presents some new ideas and methods of diagnosis worthy of note and consideration. The author divides trachoma clinically in two forms: (1) fulminating trachoma, and (2) slow trachoma. The first type has been denied by some authorities, but Dr. Foster was able to observe it among the crowded steerage passengers of vessels coming to Ellis Island. Slow trachoma may itself be either acute or chronic.

For making the diagnosis proper examination of the lids is of great importance. For this purpose and specially to expose the cul-de-sacs, the best instrument is the ordinary wire loop glove buttoner, with its blade slightly bent upon its plane, resembling a miniature obstetric forceps. By pressing the tip of this instrument upon the skin surface of the everted lid and putting the structures over it on the stretch, the conjunctiva can be made more or less anemic. It is important to become familiar with the appearance of the normal lid subjected to this pressure, and then to study the common inflammations and trachoma.

When the normal lid is made tense by pressure the blood is forced out of the tissues and a white area appears, which is pure white or pink and shades out evenly in all directions. Faint vertical streaks running up and down, due to the Meibomian glands, are seen. The same condition holds true for all simple inflammatory conditions of the lid.

In trachoma, however, when the conjunctiva is made anemic in this way, it does so in a blotchy and uneven manner. The bloodless area does not fade out evenly to the pink and red of the normal conjunctiva, but patches of red

and white alternate in a more or less haphazard and irregular fashion. White streaks run not only up and down but transversely and in all directions. To get this effect too much pressure must be avoided.

The explanation of this phenomenon is that in trachoma the structures are not homogenous as in normal lids. Scar tissue is formed and deposited in irregular patches and between these, areas of highly vascular inflammatory tissue or normal conjunctiva exist. When pressure is made, the ordinary invisible scar tissue becomes white, so that by this maneuver the oculist is enabled to diagnose the early stages of trachoma.

According to Dr. Foster trachoma might be better called "scar producing conjunctivitis." The scars begin in mild cases at the inner canthus at the junction of the tarsal plate with the cul-de-sac and the latter becomes completely transformed into scar tissue, long before the process is completed on the upper lid.

The diagnosis between trachoma and follicular conjunctivitis must be based not only on the condition of the conjunctiva of the cul-de-sac and lower third of the tarsus, but also on the blood supply of the former. In normal eyes the cul-de-sac is bluish pink and contains numerous blood vessels; at this spot the conjunctiva is thin so that the arteries stand out very distinctly like cords, anastomosing at the base of the tarsal plate by horizontal branches which form pointed arches. From these arches numerous fine vessels rise which run directly upwards, on the inverted lid. (The author refers probably to the arcus tarseus superior which runs upon the fascia tarso-orbitalis and gives vertical branches.) In trachoma the normal vertical vessels disappear in the cul-de-sac; only adventitious vessels, running

sometimes in an oblique direction, can be detected.

In follicular conjunctivitis the vessels may be hidden, but, says the author, "if any vessels are observed running in a vertical or approximately vertical direction across the cul-de-sac it is safe to exclude trachoma." Occasionally it may be necessary to treat the eyes with a slight astringent in order to relieve a temporary inflammation, before giving a positive opinion.

Foster prefers grattage made with a tooth brush to expression or curetting, because its results are more durable. When the tarsal plate is involved grattage must be followed, some weeks afterwards by excision of the tarsus. The illustrations accompanying this paper are unusually good, having been taken from nature at the U. S. Immigrant Hospital, and enlarged three times.

M. URIBE-TRONCOSO.

**Sautter, Albert C., Philadelphia—Ocular Palsies in Infantile Paralysis.**  
(Annals of Ophth., Oct., 1917.)

The writer calls attention to the infrequency of head symptoms in infantile paralysis, in the majority of cases the cord alone being involved. The involvement of cranial nerves is certainly not frequent; and in the majority of instances it is transient and followed by a restoration of nerve function. Cranial palsies may complicate cases resembling the Landry type of paralysis, a rapidly ascending, generally fatal type; or less frequently the descending type of the disease. In the bulbar-pon-tine variety, paralysis of the facial nerve is the most usual complication, paralysis of the extraocular muscles per se occurring most rarely. Of these the abductors and oculomotor nerves, in order of frequency, are most apt to be involved. Sometimes, however, a more or less complete ophthalmoplegia intervenes, which is usually unilateral. Implication of the optic nerve is rare.

Sautter gives the histories of two cases observed during the recent epidemic. One with bilateral external ophthalmoplegia still present after six months, the other an example of paralysis of conjugate lateral movements

with marked improvement after six months.

A review of 669 case histories of infantile paralysis at the Philadelphia Hospital for Contagious Diseases in 1916 is given. Nineteen, or 3 per cent, showed disturbance of the extraocular muscles. Of these 13 were sixth nerve paralysis, and 4 of these were complicated with seventh nerve paralysis; 3 presented bilateral sixth nerve paralysis, one external ophthalmoplegia, and another paralysis of the associated ocular movements. There was ptosis in one instance, and ptosis combined with other ocular lesions in two others. Nystagmus was noted in several cases. In seven of the 19 cases, the cranial nerves were the only nerves affected. Facial paralysis was comparatively frequent and occurred in 78 patients. In the few cases examined ophthalmoscopically, no fundus changes were found.

In accord with the findings of other investigators, he found the seventh nerve most frequently involved, then the sixth, and least often the third. Reviewing some other reports he quotes Medin's analysis of 64 cases with facial palsy in 9, hypoglossal paralysis in 5, sixth nerve paralysis in 6, eleventh nerve involvement in 4, third nerve palsy in 3, fifth nerve paralysis in one, and in one or two, tenth nerve involvement. Wickman in the Swedish epidemic in 1905, found in 868 cases, isolated cranial nerve palsies in 22, and combined cranial and spinal nerve palsies in 34.

Leegard in 311 cases taken from the Norwegian epidemic in 1905 reports only two isolated cases of facial palsy, and 3 cases associated with spinal symptoms, also one case of ptosis with spinal symptoms. E. Mueller in 100 cases found 13 facial palsies, 3 unilateral abducens palsies; no other nerves involved. Zappert in 290 cases from the Vienna epidemic in 1908 found cranial association with spinal nerve lesions in 25 patients. And finally in the New York epidemic in 1907 an analysis of 752 cases showed 27 facial, 18 lid palsies, and 26 cases of strabismus.

C. H. M.

**Leplat.—Ocular Troubles Produced by Distant Explosives.** (Archives Med. Belges, May, 1917.)

A soldier stationed at a distance of one mile to a mile and a half from a powder charge was injured in the eye by the explosion.

When seen the eye presented hyphemia and ciliary injection, the anterior chamber was sprinkled with blood and disturbed. He complained of moderate pain in the eye and photophobia. A cure was complete after seven or more days. DANIS.

**Burger.—Study of the Syndrome of Claude. Bernard - Horner.** (Arch. Med. Belges, April, 1917.)

A soldier was injured on the left side in an automobile accident. The next day the left eye presented moderate ptosis, enophthalmos, miosis with preservation of reflexes, lacrimal secretion and rapid nystagmus. Diplopia on looking up and to the right, and hypotony of the globe. Relaxation of the vocal cords on the right side, and ocular paralysis.

Conclusions: Ocular lesions were associated with disturbance of the seventh, tenth and eleventh nerves and the cervical sympathetic. DANIS.

**Rasquin. Provoked Conjunctivitis.** (Arch. Med. Belges, April, 1917.)

This form of conjunctivitis induced by soldiers to escape military service has the following characteristics:

1. It is always unilateral.
2. The conjunctiva is inflamed and swollen, sometimes violently so, but rarely as evidenced in diphtheritic conjunctivitis or from injury by caustic. The conjunctiva of the lower cul-de-sac only is affected.

3. Examination of the secretion never shows bacteria, but reveals epithelial cells or polynuclear cells, and sometimes the cause of conjunctivitis.

4. The source of injury is often found in the pocket-book, a leaf, or in the watch case.

5. The malady is cured without treatment other than hermetically sealing the eye. DANIS.

**Brunetière and Amalric.—Severe Hemorrhage Following Rupture of Sclera.** (La Clinique Ophthalmologique, May, 1917.)

As army specialists these surgeons are of the opinion that enucleation should only be performed after thoughtful consideration by ophthalmic surgeons and should not be advised by operators unskilled in this specialty. They illustrate their point by a case report: A soldier was wounded by a shell fragment which penetrated the lids over the caruncle, splitting conjunctiva and sclera. Despite pressure and irrigation hemorrhage was so profuse that immediate intervention was called for. Hand movement was appreciated to a certain degree, so under general anesthesia a scleral suture was inserted which immediately stopped the blood flow. There was no escape of vitreous showing that the injury had only penetrated the outer layers of the choroid. The final result was a vision of 4/10 and the entire history proves, in the authors' opinion that oculists are required even in the evacuation hospitals so as to be available early in the course of the injury. J. S. W.

**Santos Fernandez, Juan.—The Absence of Dressings in Eye Operations.** (Archivos de Oftalmologia Hispano - Americanos, September, 1917.)

The author mentions several cases of unruly patients who took off the dressings the day of their operations and in spite of that were cured, healing of the flap being generally completed in the second day. He agrees with Menacho that in cases of normal tension the dressing is not absolutely necessary and could be avoided, but thinks that it would be better to wait at least two days after the operation to dispense with it. F. M. F.

**Garcia.—Cataract Complicated by Hysterical Amaurosis.** (La Clinique Ophthalmologique, June, 1917.)

Garcia describes the case of a forty-two year old woman who had had previous attacks of hysteric nature. The lenses had become cataractous gradually; but two months before admission



she lost completely the light perception in both eyes. As she showed no signs of intraocular trouble it was decided to attempt an extraction even without much hope. The presence of lacrimal disease delayed the procedure twenty days, after which a perfectly simple operation was performed and although the pupil was black no light was appreciated. Twelve hours later the patient had a slight convulsive seizure. On the third day her vision improved and on the fifteenth with a + 11 she saw 2/3. Qualitative vision also returned in the unoperated eye. J. S. W.

**Darier.—Treatment of Iritis with Sera, Sensitized Vaccines and Sero-Bacterins.** (La Clinique Ophtalmologique, June, 1917.)

Darier has been experimenting for years with serotherapy in ocular infections and has found no specific except for diphtheria. His paraspecific injections have been fairly successful only with diphtheritic and antitetanic sera while the others have failed. For the past three years Darier has endeavored to replace the diphtheria serum of Roux by a polyvalent one, but his results have not improved. The action is assumed to be an increased phagocytosis with a stimulation of the nerve cellular agents.

His most recent successes have been with Mulford's sero-bacterins and in three cases the pain of acute iritis disappeared within a few hours. These cases were all of obscure origin with no discovery of a specific cause and four injections gave complete cures. Darier gives full credit to Wendell Reber as the first to claim the great success of sero-bacterins in the treatment of iritis. J. S. W.

**Darier.—Parenteral Injections of Sterilized Milk for Ocular Infections.** (La Clinique Ophtalmologique, June, 1917.)

Darier mentions the recent reports of success with milk published in Germany. Pflugk of Dresden considers this remedy the most important discovery in the past twenty-five years and he has had remarkable results in all infections including gonorrheal

ophthalmia with corneal involvement. In phlyctenular conditions and choroiditis no results have been obtained so it is necessary to determine the indications for this new therapeutic measure. The manner of preparing the milk must be most precise. The cow is tuberculin tested. The milk is projected directly into ten cc. ampules and then sterilized for thirty minutes in jets of steam on two successive days. This gives the milk a pale brownish color with small bits of casein floating around, these, however, never interfering with the syringe nor influencing the curative action. The entire 10 cc. are to be used.

Then follows the discussion upon this subject at the Vienna meeting. Koenigstein has used this method in 30 cases with great relief in keratitis and iritis after 2 injections. No benefit in trachoma, slight constitutional changes and in two cases, characteristic exanthem. Dimmer thinks that the action is purely from the albumin which is the source of benefit in Deutschmann's yeast therapy and Darier's paraspecific methods. Leopold Mueller has obtained no results in muscular paralyses and optic atrophy and said that the observations were much too recent to draw conclusions.

The most remarkable results quoted are obtained in interstitial keratitis which had resisted all energetic specific cures and local treatment. The injection of an albuminoid produces an immediate disappearance of the pain and photophobia with a marked shortening of the course of the disease. Three injections of 5 cc. of milk per week is sufficient. Darier with his serum method has stopped the subjective symptoms but has seen no miraculous cures, and doubts the production of these unbelievable miracles, but is willing to give the method a more thorough trial. J. S. W.

**Kirk, J.—Eye Changes in Trench Nephritis.** (*Brit. Med. Jour.*, Jan. 5, 1918.)

While on duty at Malta, the writer had the opportunity of examining a series of about 80 cases of trench

nephritis, or what he prefers to call war nephritis, all coming from the Macedonian front: these were chiefly young active soldiers between 20 and 30 who had suffered fairly severe exposure and strain. Nearly all the cases presented the disease in a severely acute form, and on their admission were mostly seriously ill; at that time there was found invariably marked retinal congestion with large pulsating veins but no signs of exudation or nerve involvement. Some weeks later nerve swelling and patches of retinal exudate were found in some; this led to re-examination of all of the cases about three months from the onset of their illness, and the writer was then able to classify them as follows:

Group A (about 21), all convalescent with no symptoms except slight anemia and debility and generally no albumin in the urine, except a slight trace in a few, showed retinal changes in only four instances, and such changes were slight—a few small spots of exudation, a small punctate hemorrhage, a slight haziness of the disc edges, or a little edema along the course of the veins.

Group B, a series of 20 cases who had not progressed as well as the others, showed albumin in small amount, and often dyspnea and slight edema; 8 of these showed minor retinal changes with small spots of exudate.

Group C, 13 in number, were severe cases in which the disease was still marked; these were suffering from marked general symptoms, severe edema, a large quantity of albumin in the urine and sometimes blood; 4 of these showed very definite retinal

changes and 4 changes of slighter nature.

As far as could be ascertained, there were no signs of any other complicating disease, with the exception that several cases showed malarial infection. In none was there any history of previous kidney attacks. In 9 of the cases presenting the more severe retinal changes a Wassermann test was done, and in all of the 9 the result was negative.

Regarding the fundus changes, it was observed that while the spots of exudate were near the disc and macula, the typical silvery star-shaped figure was not seen. Hemorrhages were uncommon, and when seen were of the small punctate variety. The disc was often affected, either definitely swollen or slightly indistinct at the edges. There were small areas of edema, especially along the course of the veins.

In summarizing, the writer says that in this disease the retina is very liable to be involved, although gross changes are not evident early and later there may have been absorption; that the pathology is probably an acute congestion from some specific toxin, and that the exudate clears up in the majority of instances without leaving permanent results; that the retinal changes do not affect the prognosis, except in so far that the severer these changes the severer the cases, though by no means necessarily so; and that the condition is one which is probably allied to the acute retinitis of pregnancy, scarlatina, and acute uremia, and should not be confounded with the retinitis of chronic kidney inflammation with its permanent changes in the retinal circulation vessels and tissues. C. H. M.

# SOCIETY PROCEEDINGS

## PITTSBURGH OPHTHALMOLOGICAL SOCIETY.

Meeting of February 4, 1918.

DR. EDWARD STIEREN, Vice-President,  
in the chair.

### Ptosis and Abducens Paralysis.

DR. J. FLOYD MURDOCK presented for study and suggestions as to treatment Albert H., age 13, school boy. The labor at his birth was long and difficult, forceps having been used. The mother noticed shortly afterward a marked drooping of the left upper eyelid, which has remained unchanged until the present time. Inspection shows a slight facial asymmetry, complete ptosis of the left upper lid and a small depressed scar over the left parietal region; the eye seems to be slightly proptosed. There is a paralytic convergent strabismus, abduction each eye being nil, and the rotation upward and downward greatly impaired. The pupillary reactions are normal. The ophthalmoscopic examination shows in each eye a moderate refractive error, but no organic lesion. Vision without correction is O. D. 20/40, O. S. 20/70.

DISCUSSION.—Dr. Adolph Krebs stated that as there is no manifest diplopia, operative interference with the strabismus was inadvisable as an approximation of the images might produce a very troublesome diplopia, the fusion sense being undeveloped.

Dr. Stieren suggested a plastic procedure for the correction of the ptosis—for cosmetic effect—that of Panas being mentioned as particularly applicable in this case.

### Optic Atrophy.

DR. S. A. STURM presented W. C. M., age 28, electrician. In December, 1916, his lumbar region came in contact with a wire carrying 2,200 volts. He was unconscious for five or six minutes, was slightly burned, but returned to work in two or three days. In January, 1917, the back of his neck came in contact with a wire carrying 500 volts.

He was unconscious at this time for only one minute and was not burned. Within a month he first noticed a gradual diminution of the visual acuity, more marked in the left eye, which has progressed until at present time he has light perception only in each eye. The patient is positive that prior to January, 1917, his vision was good. He does not admit venereal infection, although his wife has never been pregnant. The patellar reflexes are absent, station is decidedly unstable, gait ataxic, coordination of upper extremities is good. The pupillary reactions are normal and the ophthalmoscopic examination shows each nerve head to be atrophic, of a dirty grayish white color and the arteries somewhat contracted.

DISCUSSION.—The members present were of the opinion that the optic atrophy was primary and advised the securing of a Wassermann.

### Tumor of Orbit.

DR. E. E. WIBLE reported the case of Mrs. B. C., age 29 years, housewife. She has had three children, of whom one is living. Family history is negative as to cancer, "tumor," etc. Present weight is 115 pounds; maximum weight three years ago, 145 pounds. Present trouble began about two years ago, at which time she developed violent cephalalgia in the region of the left vertex, recurring at intervals of a week or more. The attacks have gradually increased in frequency and severity. Two weeks before consulting Dr. Wible, exophthalmos began to develop on the left side, and when first seen the eyeball was almost entirely proptosed, downward and outward, the conjunctiva chemotic and the cornea sloughing, the entire mass being about the size of a lemon. A hard mass, firmly fixed, was found protruding from the orbit, up and inward, and a clinical diagnosis of sarcoma was made. An exenteration of the orbit was advised and was performed the following day.



Jan. 18, 1918. The postoperative history of the case has been uneventful to date.



FIGURE 1.

Case of pedicled growth attached over insertion of external rectus muscle (Stieren).

The pathologic report was a "rhabdomyoma," which is extremely rare in this locality, but very few cases having been reported in the literature.

#### **Epithelioma at Limbus.**

DR. EDWARD STIEREN reported the case of H. W. B., age 45 years, who came Aug. 27, 1917, with a huge cauliflower growth of the right bulbus (Fig. 1). Arising over the external rectus by a strong pedicle, it took on a mushroom shape, and was 12 mm. in length, 8 mm. in width, and about 10 mm. high. It extended from the external canthus, overlapped the cornea to its center (Fig. 2); and projected forward between the lids, which could not be closed over it. The surrounding conjunctiva was inflamed and thickened and there was considerable ropy discharge. The color and general appearance of the mass was that of a pale red raspberry. There was no involvement of the preauricular or any of the lymphatic glands.

According to the patient's statement the trouble began about a year ago as a localized inflammation with a slight elevation. He has a lesion above the right ear which has been diagnosed as "skin cancer" and for which radium exposures are being used with good results. Under local anesthesia the growth was removed at the South Side Hospital Aug. 29, 1917. Two parallel, horizontal incisions were made about 3 mm. above and below the growth, extending from the limbus of the external canthus, and the conjunctiva between, including the subconjunctival tissue, and the growth dissected off. At only one point, over the insertion of the external rectus, was the growth attached to the sclera. Four vertical incisions were then made, two upward, from the ends of the upper horizontal incision and two similar ones downward, the upper and lower flaps of conjunctiva dissected loose and sutured over the defect. There was no involvement of the cornea, not even a haziness of its epithelium.

Healing was prompt and uneventful, the sutures being removed on the fifth day. The specimen was examined by



FIGURE 2.

Stieren's case of epibulbar tumor showing extent of overlapping of the cornea.

Dr. Jacob Ročkman, who pronounced it an epithelioma of papillomatous type. Appreciating that recurrence of epithelioma after local removal is common, X-ray exposures to the site were urged and accepted. He was accordingly rayed by Dr. G. N. Schaeffer, nine exposures of from one to two milliamperes, in two to four minute seances, being given at intervals from Sept. 4, 1917, to Oct. 27, 1917.

He was last seen the early part of this year. The conjunctiva is pale, smooth and glistening, and is on tension only when patient looks strongly to the left, and there is no limitation of excursion. Vision in each eye is 6/5.



FIGURE 3.

Appearance of patient two months after removal of growth.

The accompanying photograph (Fig. 3) was taken about Nov. 1, 1917. Since then his appearance has further improved, inasmuch as he has acquired the habit of opening his right eye as widely as his left.

HUNTER H. TURNER.

## ROYAL SOCIETY OF MEDICINE.

### Ophthalmological Section.

Meeting of February 6, 1918.

PRESIDENT, MR. WILLIAM LANG,  
F. R. C. S.

### Vitreous Changes from Penetrating Septic Wounds (Couching).

LT. COL. R. H. ELLIOT read a paper on this subject, illustrated by a profusion of slides, taken from a wide experience in India. The author reviewed the paper on a similar subject, published by Professor Straub in 1912, based largely upon the experimental injection of the eyes of two rabbits with tubercle bacilli, resulting in infection of the ciliary body. The Professor contended that the septic matter set up chemotactic action in surrounding vascular structures, and caused also optic neuritis.

Col. Elliot's present paper was based upon 780 cases of couching, and the anatomic examination of 54 globes. The material was therefore more abundant than Straub's, and there was a greater variety in the conditions of infection, for, in the practice of the operation by native Indians the instruments, hands, and surroundings were filthy. There was a great variation in the age and health of the patients, in the nature and virulence of the introduced organisms, in the period after operation at which the material was obtained, and in the methods of operation.

Slides were shown of extreme instances, and he asked that they might be regarded as affording an opportunity for the elucidation of pathologic problems, as a series of experimental infections of the eye with septic material. In couched eyes, the appearances found in the vitreous included slight gauzy films, filmy masses in the anterior part of the chamber, a fine cone of exudate in the vitreous, an organized cone of exudate, masses of exudate scattered through the vitreous and isolated inflammatory foci therein, total detachment of retina with inflammatory matting of all parts, and the remains after panophthalmitis. He contended that the difference between the

exudate massed in the anterior part of the vitreous and the cone of the vitreous was artificial. In his specimens there was a breaking of material in transit from India.

Localized infection of the vitreous was not met with, except in one case, in which the tip of a copper probe was left behind, and where organization appeared to be strongest near the ciliary body and near the optic nerve head, and this was a matter of vascular supply. The backward flow of lymph to the channels round the nerve head was suggested by the cone of exudate, and he showed specimens which supported this view. There were new-formed vessels in the apex of the cone of exudate. In the author's view, Straub's contention that hyalitis was due to chemotaxis following the deposition of septic matter in the vitreous, took too little account of the infection of surrounding structures. The occurrence of plastic uveitis sufficed to explain the vitreous opacities seen during life, as well as the vitreous exudate seen in the specimens. Detachment of the retina was found in 70% of the cases, and this was explicable by the pouring of exudate into the vitreous chamber, adhesion of the exudate to the retina, and a shrinking of the exudate. Was the pouring of the exudate into the vitreous chamber due to chemotaxis from an infected vitreous, or to a primary infection of the surrounding vascular coats? He inclined to the latter view. The lens lay in front of the anterior hyaloid membrane, and in two of the cases the vitreous was not invaded by the instrument, yet there was an abundant vitreous exudate. The retina contracted adhesions to the exudate by the wound and by inflammation the result of chemotaxis, by inflammatory thickening of the anterior layers of the hyaloid body, and by cicatricial bands radiating from the focus of infection.

DISCUSSION.—Mr. Treacher Collins said he had spent some hours studying this wonderful collection of specimens, and found they abounded in points of clinical and pathologic interest. With regard to the mode of infection of the vitreous humour, Professor Straub's main contention was that the exudate

from the ciliary body was not forcibly expelled therefrom, but drawn into the vitreous, an attraction into it by chemotactic action. Straub showed that the dust-like opacities in the vitreous, seen in keratitis, were little groups of phagocytes, not scattered promiscuously, but definitely arranged on the outer side of the hyaloid membrane. Straub did not, however, adequately explain why chemotaxis was more potent at certain points than at others. Mr. Collins' own contention was that the central points were not dead phagocytes, but dead tissue cells which had desquamated from the surface of the ciliary body or from the iris; that these were carried forward in the lymph stream of the aqueous and its duct to the back of the cornea, and there set up chemotaxis.

Mr. Herbert Parsons did not consider there was so much difference of opinion between Professor Straub and Colonel Elliot on this matter as the latter seemed to think, and much of it might be attributable to the Professor's incomplete knowledge of English. The value of Professor Straub's specimens was that they showed an early stage of the infection of the vitreous. It seemed clear there was a localized infection of the vitreous in the early stages, but that it rapidly passed into a general infection of the vitreous. He, Mr. Parsons, could not conceive of a lens being depressed, reclined, or transmitted into the lower part of the posterior chamber of the eye, without injuring the vitreous very seriously. He expressed his high appreciation of Colonel Elliot's contribution.

### Contraction of Central Retinal Artery.

MAJOR A. W. ORMOND read a note on the direct observation of the fundus oculi during a period of temporary blindness. A major in the French Army, at present engaged in engineering work, came to consult him. Five days earlier, in the evening, he suddenly lost the sight of his right eye for about eight minutes, and since then he had had seven or eight attacks of equal duration. It was not followed by headache or pain. One attack occurred while he was in a darkened room. Some of the attacks seemed to be associated with his movements, such



as stretching his arms after sitting in a cramped posture. He had lived for some years in the French Gaboon, and had suffered badly from lumbago.

While giving his history, he had an attack, and Major Ormond examined the eye while it was in progress. The pupil of the right eye enlarged to about 7 mm. in diameter. The optic disc was blanched, also the immediately surrounding retina. Veins alone of the vessels were evident, the superior and inferior retinals being those chiefly under notice. The inferior retinal showed distinct notching on its concave side only: there were four or five notches. While being watched they suddenly disappeared. The vein resumed a normal appearance. The patient then suddenly remarked, "It is coming back." In a few seconds he could see again, and the pupil contracted to the size of the other. The optic disc looked redder and more suffused than normal. The arteries showed their position, the superior artery twisting round the superior vein, so causing the appearance seen when first looking at the eye. It seemed to have been a localized contraction of the central retinal artery, resulting in a temporary blanching of the disc and retina in the immediate neighborhood, with a gradual lessening of the blood in the veins, so that the endothelial lining had become ruffled into horizontal folds as the lumen emptied. Subsequent pressure on the globe with the finger resulted in almost complete emptying of the artery and considerable depression of vision. Dr. John Fawcett's examination of the patient a few days later did not reveal any signs of organic disease. His maximum systolic pressure was 130 mm., and the radial arteries were good. Heart and urine were normal. The contraction of retinal arteries seemed to be similar to that in the "amblyopia of migraine." It could scarcely be regarded as intermittent obstruction. The attack was probably due to sedentary life and excessive cigarette smoking.

Somewhat similar cases were referred to by the President, Mr. Herbert Parsons, Mr. Bardsley, and Mr. Vernon Cargill.

H. DICKINSON,  
Reporter.

## WILLS HOSPITAL OPHTHALMIC SOCIETY.

Meeting of December 4, 1917.

### Disciform Keratitis.

DR. WM. ZENTMAYER presented a case of disciform keratitis, in a carpenter 51 years of age, who stated that two months ago, the vision of the right eye became blurred. The eye had been uncomfortable for several months before the vision was affected. There is no history of injury. Examination shows a very slight pericorneal injection. On the cornea, somewhat eccentrically placed up and out, there is a disc shaped opacity about 7 mm. in diameter. The rim of the opacity is more dense than the central portion except at the exact center where there is also a spot of slightly deeper infiltration. The whole area is made up of fine granular dots. The upper margin of the opacity reaches within two millimeters of the limbus, and at this point the infiltrated margin is a little broader than elsewhere, giving a signet-ring appearance. At this point the limbal conjunctival vessels are slightly enlarged. The entire area of infiltration is anesthetic. Tension is slightly minus.

Dr. Zentmayer said that he was willing to accept the view that this type of keratitis was of neuropathic origin; but he thought that the theory of mild infection was more in keeping with the clinical features, the course, and the results of experimental research.

### Tuberculous Keratitis.

DR. SAMUEL D. RISLEY, discussing the subject of tuberculous keratitis, said that in his experience the tubercular deposits in the cornea were suggestive of uveal involvement, since they usually occurred at the angle of the anterior chamber or on the membrane of Descemet, which was embryologically an extension forward of the uvea. He cited as corroborative of this view the case of a man upon whom he had performed an iridectomy for the relief of an acute attack of increased tension. Convalescence was tedious, and the examination with oblique illumination revealed a grayish deposit in the region of the base of the coloboma. A von Pirquet test produced marked lo-

cal and general reaction with elevation of temperature. The eye recovered rapidly under the effect of increasing doses of old tuberculin. The ophthalmoscopic examination revealed a condition of general choroiditis with atrophic yellowish patches.

Dr. Risley thought that the tubercular choroiditis was a sufficient explanation for the abrupt onset of increased tension of the globe, and for the delayed convalescence after the iridectomy.

### Epithelioma of Orbit.

DR. WM. CAMPBELL POSEY exhibited a case of extensive epithelioma of the orbit. When the case had first come under his care a year ago, the growth had invaded the external canthus and had pushed its way around the external wall of the orbit to the temple. He had dissected out the mass as well as he was able and had filled in the gap of denuded tissue by a pedicled flap from the temple. The case then passed from his observation until two weeks ago, when an extensive recurrence of the growth was noted, the first signs of which were said to have appeared about three months after its removal. The tissues of the outer side of the globe appeared to be involved and the eye doomed. As the patient was already blind in the other eye from an over-ripe cataract, the prognosis was bad. Before operating on the cancerous area, the removal of the cataract was accomplished. Some days later, under ether, the entire cancerous area was removed with the knife, and the subjacent tissues thoroughly treated with electrical desiccation by Dr. Wm. L. Clark. As is now evident, the result of this procedure surpassed all expectations. The entire operative area is granulating and filling in with great rapidity. Notwithstanding the advanced age of the patient, 67 years, and a condition of general arterial sclerosis, the tissues of the eye are healthy and corrected vision is normal. Dr. Posey spoke in enthusiastic terms of the remarkable results achieved in such cases by desiccation.

### Operations for Contracted Socket.

Dr. Posey spoke concerning the various operations devised for the cure of contracted orbit, and referred particularly to the case of a young man whose orbit had been almost entirely obliterated as the result of a lime burn. The lower cul-de-sac, restored by the Maxwell operation, was amply deep, but there was some drawing downward of the outer half of the lower lid. Dr. Posey said that he had observed this complication in all of the cases which he had operated upon by this method, and thought that the author of the operation had directed that an unnecessarily wide area of skin be taken from beneath the lower lid. Instead of a width of 10 mm., he considered that 7 or 8 mm. suffices, and in future operations he will so modify the incision that the flap is somewhat narrowed at its temporal border. With the assistance and counsel of Dr. P. N. K. Schwenk, he had obtained a sufficiently deep upper cul-de-sac by splitting the external canthus and implanting into the upper part of the socket, previously prepared for its reception by a careful dissection of the remnant of mucous membrane present from the subjacent tissues, a long skin flap taken from the lid just below the brow. Following the recent method of Schwenk, the outer canthus was repaired, at the time of operation, by the insertion of deep sutures tied over a button. These pulled out in a few days, necessitating the repair of the gap left at the outer angle of the socket a second time.

Dr. Posey spoke of the importance of carefully stitching the flap to the edges of the denuded area. The repair of the outer angle was accomplished some weeks later, by excising a diamond-shaped area of skin from the base of the flap, union of the implanted portion of the flap having now taken place with the tissues surrounding it. A Fox conformer was kept constantly in position in the socket.

HAROLD W. HOW, M. D.,  
Secretary.

# American Journal of Ophthalmology

Series 3, Vol. 1, No. 4.

April, 1918

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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Proof should be corrected and returned within forty-eight hours to the Associate Editor. Reprints may be obtained from the printers, Tucker-Kenworthy Co., 501 S. La Salle St., Chicago, Ill., if ordered at the time proofs are returned.

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## EDITORIALS.

### SCIENCE VERSUS SENSATION-ALISM.

"The public likes to be fooled and we give 'em what they want," said the proprietor of one of the most disreputable yellow journals in America. To serve the purpose of the sensation-monger the realm of pretended science is always open and inviting. When a scientific hoax is to be launched, the name of some alleged "great scientist," or "scientific" journal is needed to give it a start. With that provided plausible suggestion will make it go smoothly.

A really artistic bit of this kind of literature was started in the Scientific American of January 12th, 1918, has been quoted in the Literary Digest for March 3rd, and is finding its ultimate goal in the minds of credulous readers through the "patent insides" of the country papers. It is entitled "New Light Upon Our Eyes," and purports to announce the discovery, that faults of focus of the eye depend upon the ab-

normal action of the external ocular muscles.

The name of Dr. W. H. Bates, "discoverer of the properties of adrenalin," is used as the great authority to gain a hearing for the "story" of the enterprising writer. Then plausible suggestion is made to take the place of any statement of established fact.

There is no reason why Dr. Bates should not have credit for the priority of his observations, and the important part he took in calling the attention of the profession to the value of suprarenal extract. But such facts should not be used to camouflage the status of an hypothesis, which is essentially opposed to the great mass of evidence bearing upon it. This evidence is readily accessible to any editor who knows how to use an encyclopedia; and the statement that Dr. Bates hopes to establish his views "by a series of experiments not yet concluded" should have caused the editor of any scientific publication to look into the matter.



Another instance of false suggestion by a plausible phrase is in the allusion to "the exterior muscles of the eyeball, the function of which has long been a matter of dispute." In a way every function of the body is but partly understood, and many a point regarding it might properly be "a matter of dispute." This is true of the functions of the external ocular muscles. But some things are as well established with regard to their functions and the limitation of their actions, as any facts in physiology or physics.

The support of the retina where it will receive accurately focussed light is the dominant function of the eyeball; and it is not left to the mercy of accidental error, or bad habits in the use of the muscles of fixation. The firm resistant sclera and still more rigid cornea, and especially the thickened sclero-corneal junction, with the constantly maintained intraocular tension effectively guard the dioptric surfaces of the eye from any disturbing influence of the muscles attached to the sclera.

The eyeball is not absolutely rigid so that it could be shattered by a blow. It has enough resiliency to save it many times from destruction. Its shape can be changed by outside pressure, as that of the lid muscles, or pressure through the lids. But it is sufficiently rigid to reduce any change that can be effected in its shape by action of the external ocular muscles to an insignificant and harmless amount, completely removed from changes that perceptibly affect the distinctness of vision. The hypothesis that the focusing of the human eye was influenced to any important extent by the extra-ocular muscles was once admitted and discussed; but was completely discarded when accurate measurements of the dioptric surfaces of the eye began to be made. It will take much more than "a series of experiments not yet concluded" to revive it.

Of course this hypothesis takes its sensational value from the fact that a great many people do not like to wear glasses. Thousands that are wearing them would like to discard them, and

tens of thousands who do not wear them prefer to strain their eyes rather than give the needed assistance to their focusing powers. Such people would welcome any "system" that would enable them to get along without glasses, as they would welcome any system that enabled them to live without paying for what they eat or wear. Such a system opens vast opportunities for quackery. It is not suggested that this consideration has influenced Dr. Bates in his pursuit of his idea. But the feeling that a discovery was possible that would satisfy the desire of a large number of people, might affect and partly disqualify an enthusiastic investigator for judging critically the value of his observations.

Here is where the judicial function of a scientific journal should come into play; and especially one that presents scientific discoveries of supposed value to a popular constituency, most of whom cannot judge off-hand of the value of the ideas presented to them, regarding things entirely outside their usual sphere of thought. Is it asking too much of this class of journals that all their startling novelties should be submitted to an expert for criticism, before being blazoned to the public with all the prestige the reputation of the journal can give? Such a policy would undoubtedly lessen the number of such sensational announcements, but it would help the scientific prestige of the journal.

E. J.

### PREVENTION OF EYE INJURIES.

After the Halifax disaster, the reports of the great number of persons blinded by it seemed almost incredible; the chances of injury to the eye in any ordinary accident were so enormously exceeded. But when we learn that previous alarms and excitement, with the glare of a fire, had drawn great numbers of persons to the windows to look out, when the great explosion came to shatter the glass and drive it inward, the excessive proportion of injuries to the eye is explained.

Eyes have been injured by fragments of glass in just this way before, but

the Halifax disaster strongly emphasizes the danger of standing close to and facing window glass in certain emergencies. Sudden explosion, wind, or missiles thrown towards glass may all produce a similar result. This danger deserves to be made the subject of popular warning, as much as the avoidance of exposure to wood alcohol or the looking at the sun during an eclipse. The danger from breaking of glasses worn is very slight compared with this. Probably in such an explosion, glasses worn on the face would be a protection rather than an added danger.

Another form of injury against which warning is particularly appropriate at the present time, is that which results from the various forms of near guns in the hands of children. From the primitive bean shooter to the elaborate air gun, the missiles from these weapons are particularly disastrous to the eye. To be struck by one of them causes so little damage to other parts of the body, that most persons overlook the danger they possess for the eye. The total force exerted is not great, and falling on most parts of the body entirely harmless. But it is concentrated; and when the eye is struck, serious injury very often results, and sympathetic ophthalmia with complete blindness is a possible outcome. The only effective method of preventing such injuries is to keep the weapons in question out of the hands of children, or to regard them always as being in the same dangerous class as the fire-cracker, revolver, shotgun, or rifle.

E. J.

### OPHTHALMIC JOURNALS.

The ophthalmologist who reads a current ophthalmic journal published in the English language now reads a good journal. The Archives of Ophthalmology rapidly approaching the fiftieth year of its publication has always sustained a high scientific and literary standard of requirement for admission to its pages. Considering the large proportion of its matter, that

was derived from German sources, it has kept up its standards remarkably well, since the outbreak of the present war cut off this source of literary supply.

The British Journal of Ophthalmology has brought together the valuable features of the three publications that combined to form it. Since the war began, many of the leading British writers on ophthalmic subjects have died. McNab, Brailey, Cant, Coats, Gowers, Doyne, Fitzgerald, Grossmann, Horsley, Walker, Jessop, Browne, Eve, Maxwell, Ogilvie, were all men who had contributed much of value to ophthalmic literature, and of whom farther valuable contributions could be expected. The British ophthalmologists who remain have had to bear their share of the terrific strain which the war has put upon the whole British medical profession; and the activity of younger men has been turned from the writing of papers. Yet in these adverse circumstances, every number of the British Journal of Ophthalmology has been of interest; and thru its pages most valuable papers are reaching our profession. With the ophthalmic resources of the British Empire back of this one publication, its future value is assured.

The only other ophthalmic journal now published in English is the American Journal of Ophthalmology. Of its value it is not necessary here to speak. It has already rendered one service in combining the heretofore scattered literary strength and resources of several publications. And it is not too much to claim that it helps to justify the opening sentence of this editorial. Beside the publications united to form this journal, two others which have heretofore been partly devoted to the literature of ophthalmology went out of existence with the close of 1917. The Journal of Ophthalmology, Otology and Laryngology, homeopathic in its antecedents, merged with the Journal of the American Institute of Homeopathy, and the Journal of Ophthalmology and Oto-Laryngology suspended publication, its editor, Willis O. Nance, adding to his valuable public

services by entering the Medical Reserve Corps of the Army.

With three entirely independent publications in the field, there will be offered the full benefits of competition for both readers and writers. But it will be healthy competition between strong journals, and on a high plane. Then there remains the competition of the general medical journals. Many papers on ophthalmic subjects, written to meet the needs of the general medical profession, ought to be published in general medical journals, rather than in those read principally by the specialist. Doubtless in these general journals, a certain proportion of papers that should be read by the specialist will continue to appear. But the substance of these will be found among our abstracts, and in the Digest of the Literature.

On the whole, the outlook for the literature of ophthalmology among English-speaking ophthalmologists is very bright. When the present war is finished in a way to render future war unnecessary, we can look forward to an era of important progress in this literature.

E. J.

### REPORTING OF ACCIDENTS FROM LOCAL ANESTHETICS.

The subjoined communication from the Committee on Therapeutic Research of the Council of Pharmacy and Chemistry of the American Medical Association is one which will especially interest the oculist. Probably the majority—certainly a large proportion—of our operations are performed under the influence of a local anesthetic, especially cocaine, and without doubt all of us can recall cases of untoward happening, ranging from faintness to syncope. Although the communication specially requests information regarding injections of local anesthetics, it certainly cannot mean to exclude conditions following instillations into the conjunctival sac. While the pioneer is forced to come to his conclusions on the basis of a few cases, the most accurate knowledge is obtained by the collection and coordination of facts obtained from the experiences of many

workers over a long time. Certainly the use of local anesthetics in Ophthalmology has been practiced long enough to permit the statement of definite facts concerning their actions. We hope that our readers will respond to the request of the committee, and on their behalf, thank them in advance.

C. L.

To the Editor:—The Committee on Therapeutic Research of the Council on Pharmacy and Chemistry of the American Medical Association has undertaken a study of the accidents following the clinical use of local anesthetics, especially those following ordinary therapeutic doses. It is hoped that this study may lead to a better understanding of the cause of such accidents, and consequently to methods of avoiding them, or, at least, of treating them successfully when they occur.

It is becoming apparent that several of the local anesthetics, if not all of those in general use, are prone to cause death or symptoms of severe poisoning in a small percentage of those cases in which the dose used has been hitherto considered quite safe.

The infrequent occurrence of these accidents and their production by relatively small doses point to a peculiar hypersensitiveness on the part of those in whom the accidents occur. The data necessary for a study of these accidents are at present wholly insufficient, especially since the symptoms described in most of the cases are quite different from those commonly observed in animals even after the administration of toxic, but not fatal, doses.

Such accidents are seldom reported in detail in the medical literature, partly because physicians and dentists fear that they may be held to blame should they report them, partly, perhaps, because they have failed to appreciate the importance of the matter from the standpoint of the protection of the public.

It is evident that a broader view should prevail, and that physicians should be informed regarding the conditions under which such accidents occur in order that they may be avoided. It is also evident that the best protec-



tion against such unjust accusations, and the best means of preventing such accidents consist in the publication of carefully detailed records when they have occurred, with the attending circumstances. These should be reported in the medical or dental journals when possible; but when, for any reason, this seems undesirable, a confidential report may be filed with Dr. R. A. Hatcher, 414 East Twenty-sixth street, New York City, who has been appointed by the Committee to collect this information.

If desired, such reports will be considered strictly confidential so far as the name of the patient and that of the medical attendant are concerned and such information will be used solely as a means of studying the problem of toxicity of this class of agents, unless permission is given to use the name.

All available facts, both public and private, should be included in these reports, but the following data are especially to be desired in those cases in which more detailed reports cannot be made:

The age, sex, and general history of the patient should be given in as great detail as possible. The state of the nervous system appears to be of especial importance. The dosage employed should be stated as accurately as possible; also the concentration of the solution employed, the site of the injection (whether intramuscular, perineural or strictly subcutaneous), and whether applied to the mouth, nose, or other part of the body. The possibility of an injection having been made into a small vein during intramuscular injection or into the gums should be considered. In such cases the action begins almost at once, that is, within a few seconds.

The previous condition of the heart and respiration should be reported if possible; and, of course, the effects of the drug on the heart and respiration, as well as the duration of the symptoms, should be recorded. If antidotes are employed, their nature and dosage should be stated, together with the character and time of appearance of the effects induced by the antidotes. It is

important to state whether antidotes were administered orally, or by subcutaneous, intramuscular or intravenous injection, and the concentration in which such antidotes were used.

While such detailed information, together with any other available data, are desirable, it is not to be understood that the inability to supply such details should prevent the publication of reports of poisoning, however meager the data, so long as accuracy is observed.

The committee urges on all anesthetists, surgeons, physicians and dentists the making of such reports as a public duty; it asks that they read this appeal with especial attention to the character of observations desired.

TORALD SOLLMAN,  
Chairman.  
R. A. HATCHER,  
Special Referee,

### BOOK NOTICES.

**ANATOMICAL NAMES**, Especially the Basle Nomina Anatomica (BNA) —Albert Chauncey Eycleshymer, B. S., Ph. D., M. D., assisted by Daniel Martin Schoemaker, B. S., M. D., with Biographical Sketches, by Roy Lee Moodie, A. B., Ph. D., Octavo 764 pages, illustrated by numerous wood engravings and by two full-page plates in red and black. New York City. William Wood and Company. \$4.50 net.

This is almost entirely a book of reference for editors, authors, teachers, and for those physicians who aspire to purity of technical language. The author has followed the exhaustive six years' compilation of the Basle Nomina Anatomica, completed in 1894; and later published in book form in an arrangement rather difficult of orientation, as the terms were only given according to systems. So in order to facilitate the work, all the terms are arranged alphabetically with cross references to each, citing the page and serial number of the terms in their systematic positions, supplemented by 20,000 synonyms. This is the *pièce*

*de résistance* of the work, occupying a little over one-half of its 744 pages; the examination and following of which by medical writers is a consummation devoutly to be wished.

About 177 pages are given to 800 biographic sketches of anatomists by Roy L. Moodie of use for references. The preface of 9 pages is historic, and is interesting reading, showing the derivation of our medical terms from the Latin and Greek. The scholar may say "Dog-Latin or Bastard-Greek," for even as now accepted, Greek endings are appended to Latin roots and vice versa.

The multiplication of anatomic terms, even in this form of medical language, has grown to over 30,000, of which but one-fifth are appropriate and really needed. Each language, too, has its colloquial terms, ranging from that jaw breaker "Brustschlüsselzitzenfortsatzmuskell" of the Boche, to the Anglo-Saxon "Eye," either of which is nearly unpronounceable to a foreigner of another language. The former is better expressed in Latin by "Sternocleido-mastoideus" and the latter by "Oculus"; both of which may be sounded the same by all tongues.

Yet for short and pithy speech, we should adhere in ordinary conversation to the English word "Eye," as will the French to their almost unpronounceable "Oeil," or the German to "Kopfniker" for the neck muscle.

The anatomic association finally decided upon the principle that each part should have but a single name as simple and as characteristic as possible—and succeeded so well that the French proverb "Qui trop embrasse, mal tient," was well controverted, in that the great amount of work embraced was well done. The 30,000 odd Latin names are reduced to 4,500, more understandable, more simple and more applicable for the purpose, condensing and clearing up the numerous names to which different text books give different meanings.

Of the terms accepted for the B. N. A., possibly but a hundred have not gone or will not go into regular use; for a few long accepted, as the Zonula

Zinnii. Tuba Eustachii and others, though they mean nothing except memoria to antique authors, will persist. Then, too, common usage has compelled the acceptance of thalamus opticus (sleeping room) *acqueductus cerebri* (which contains no water) *acetabulum* (vinegar cup) and other names nowadays ludicrous when translated. These are so well engrafted into all languages that they or their equivalents are parts of daily medical speech.

The work is needed by medical editors, writers and teachers and should be in all medical libraries.

H. V. W.

## CORRESPONDENCE.

### Records of Visual Acuity.

*To the Editor:* In your editorial, page 71 of January number of the JOURNAL, you quote from a communication from W. A. Abbott, Deputy Commissioner of New York Department of Labor, regarding percentage vision determination, etc. He writes that vision of 20/20 represents 100% vision and no loss. That vision of 20/30 represents  $66\frac{2}{3}$  per cent vision and  $33\frac{1}{3}$  per cent loss. That vision of 20/40 represents 50 per cent vision and 50 per cent loss. "And so on down to 20/200, which would give 90 per cent loss of vision."

I cannot understand this position as commonly accepted regarding percentage vision and percentage vision loss. The fraction 20/20 simply means that the eye sees at 20 feet what a normal eye should see at 20 feet. The fraction 20/30 simply means that the eye sees at 20 feet what it should see at 30 feet. The fraction 20/40 means that the eye sees at 20 feet what it should see at 40 feet. These fractions mean just that much and no more. Percentage means a certain portion of the whole and every like portion of the whole must mean the same amount in percentage, and if taken from the whole must reduce the whole by the same definite amount, no matter from what portion of the whole it is taken. Whether we shovel from either end of the little coal

pile or from the middle, its percentage of potentiality decreases to the same alarming extent.

The trouble with this vision percentage question is that we have been taking too seriously the fractions by which we represent acuity of vision, using them as they were never intended. Arithmetically the fraction 20/40 is half of the fraction 20/20, but the vision represented by the fraction 20/40 is not half of the vision represented by 20/20.

We must establish a definite amount of vision, and loss of vision, for every certain portion of distance between that representing normal vision and that representing blindness. Normal vision we have established at 20/20. I have suggested that blindness or total loss of vision, for industrial or insurance purposes, be established as 20/220. This still gives the afflicted laborer enough vision to get about and do many things denied him by stone blindness; or loss of the globe. We have then to proportion the whole amount of vision between that (vision) represented by 20/20 and that represented by 20/220. This can only be done by allotting 1 per cent of vision to every two feet between 0/20 and 20/220. It was on this basis that I worked out the percentage vision table which I presented before the American Academy of Ophthalmology and Oto-Laryngology at the Pittsburgh meeting last October, and known as "Chapman's Percentage Vision Table."

This of course represents percentage loss only in central acuity of vision. It does not take into consideration the many and various points of damage to an individual on account of lesions following injury to an eye. Every case presents individual problems which must be considered when the matter of compensation is being determined. As a matter of fact, however, ninety per cent of adjustments are made on the condition of central acuity of vision alone; and, made wrong at that.

Sincerely yours,

V. A. CHAPMAN, M. D.  
Milwaukee, Wisconsin.

### An Omission.

*To the Editor:* My attention has been called by John Welsh Croskey, M. D., of Philadelphia, to the fact that his name had been omitted from "The History of the Rise and Progress of Ophthalmology in Philadelphia," published in the first issue of the JOURNAL. Will you kindly insert this memorandum taken from his letter: "My Dear Dr. Risley: In 1889, I started as a note taker with the late Dr. Goodman; in 1893, I was elected Assistant Surgeon, and Surgeon in 1897, serving in that capacity until 1902 when I resigned to accept the appointment as Ophthalmic Surgeon to the Philadelphia General Hospital, which appointment I still hold."

Very sincerely yours,

SAMUEL D. RISLEY.  
Philadelphia, Pa.

### Blood Pressure and Intraocular Hemorrhage.

*To the Editor:* Anent the article by Appleman and your editorial of comment thereon in the first number of our new American Journal of Ophthalmology: It is my own experience that we must go one step further and investigate the condition of the circulation of these unfortunates. In the great majority of the cases that I have seen of massive hemorrhages into the vitreous, as well as little hemorrhages into the substance of the retina, the blood pressure is above normal, in some cases enormously so, as in the case of a Mrs. M., in which it was over 300 mm. systolic, my sphygmomanometer not registering higher than that. It is a matter of regret that the latter instrument is grossly neglected by ophthalmologists in diagnosis of such conditions. In the case referred to, no urinary lesion was detectable by all the well recognized tests. In other words, while tuberculin is needed in many of these cases, in addition thereto, means must be resorted to to reduce the blood pressure or to make it compensate, and thus we bring to our aid the internist, who sometimes does not give us very much aid because he does not use the



sphygmomanometer to estimate blood pressure, but he rather attempts to rely upon the condition of the pulse. Then the ophthalmologist is driven to the internal treatment of these cases, in order to at least protect the patient against recurrence at the original site or elsewhere.

Very fraternally,

GEO. F. KEIPER.

Lafayette, Ind.

[Recurring retinal hemorrhage may be accompanied by low blood pressure, as was pointed out by the late E. W. Stevens, twelve years ago (*Colorado Medicine*, v. 3, p. 181). Probably this association occurs in the majority of patients under middle age. Its association with variations in the coagulability of the blood should also be studied. It may occur with high coagulability, as well as with low.—Ed.]

### Methylene Blue for Corneal Staining.

*To the Editors* Having read Captain Magruder's letter upon the use of methylene blue as a corneal stain, with great interest, I should like to mention a few points which he, because of excess of work and poor library facilities has probably overlooked. Methylene blue in 1 per cent solutions was first used as a corneal stain by von Reuss, and published by him in the *Arch. f. Ophthal.*, vol. 78, page 297. In this article v. Reuss used the blue only as a supplementary stain for the fluorescein, thereby obtaining a double coloring. Before this, pyoktanin had been the dye. Methylene blue is purely a stromal stain and cannot take the place of fluorescein which also colors any break in the epithelial surface. If Descemet's membrane is intact, there will be no effect from the blue color. In a case report published last year in the *American Medical Journal*, I make mention of the fact that both fluorescein and methylene blue were used in making the diagnosis.

Truly yours,

JESSE S. WYLER.

Cincinnati, Ohio.

[Priority is a difficult and elusive thing to fix, going back as it does into

history that is often very imperfectly recorded. The memorandum of von Reuss regarding methylene blue was published in February, 1911. Dr. Melville Black of Denver had called attention to the value of this drug for staining corneal ulcers in 1902, having demonstrated the staining before the Colorado Ophthalmological Society in April of that year. (*Ophthalmic Record*, v. 11, p. 594).—Ed.]

### Ophthalmia Neonatorum Law.

*To the Editor:* Having received a rather large number of inquiries about the "Composite Ophthalmia Neonatorum Law" proposed by me in the January number of the *JOURNAL*, I here subjoin a list of all those questions, together with the answers which I have made thereto—believing that others than those who asked the questions would probably be interested.

1. In Section 2, would not "into each eye" be more specific than "into the eyes"?

*Ans.*—Yes. "Into the eyes" is the language of existing statutes, which, as I stated in my introduction to the proposed law, had always been retained "so far as reasonably possible." I do believe, however, that "into each eye" is the expression which ought to be employed.

2. In Section 2, Subdivision 1, "one per cent solution is vague to physicians, not specialists."

*Ans.*—Any family physician who does not know the meaning of "one per cent solution" should have his ignorance removed immediately at the nearest drug-store.

3. You say the prophylactic should be instilled into both eyes. Why into both?

*Ans.*—It is a little hard to say whether or not the correspondent is jesting. He might read footnote 2.

4. In Section 2 (and thruout your paper), is not the word "preventive" better for legislators than "prophylactic"?

*Ans.*—"Prophylactic" is oftener used in already existing statutes than is "preventive," and, once again, (as explained on page 43, about the middle of the second column), "so far as reasonably possible the very language now of one and

now of another section of some already existing law is made use of." I tried to make a "composite" law, rather than an absolutely new law of my own, thus forestalling charges of presumption. Moreover, "prophylactic" is a word well known to lawyers. In fact even laymen, in these days, buy and use "prophylactic" toothbrushes, "prophylactic" patent medicines, etc. However, there can be no objection to "preventive."

5. Inasmuch as our law permits the registration of births inside of a week, your law would compel the physician to do double work or else put the disease on the birth blank. Could that be managed?

*Ans.*—Section 5 does provide that the preventive used and the time of its use shall be stated on the birth report. There could be no double duty in the matter, save in the very rare instances when a case of ophthalmia neonatorum did actually develop. (See Section 3.) Then the very utmost haste would be necessary, and, with the vision of a child at stake, the doctor need not worry about "double duty"—the more especially as, in cases of this kind, he himself has probably failed to do his duty in the first place.

6. "*In loco parentis*," Section 6, is Greek to most, why not say "in charge of"?

*Ans.*—"In charge of" is vague. "*In loco parentis*" is a well adjudicated expression—a strong point in its favor. "In the place of a parent" would have a certain advantage, of course, in that more people would understand it. There is not much choice, however, between these two latter expressions.

7. What is the object of Section 6? Would any good man cease attending a case until it was cured?

*Ans.*—There are various reasons why even the best of physicians must, occasionally, relinquish the treatment of a case before it is cured. The patient may remove from the doctor's "territorial jurisdiction," the doctor himself may remove, or may be discharged, etc. These events should be provided for.

8. I take issue on your footnote 4, that there is never any need of any treatment after the preventive has been used, for I have seen an instance of an attack after

it had been *apparently* properly used.

*Ans.*—The footnote is not a portion of the proposed law. Whether right or wrong, therefore, it cannot affect the form of the proposed law. Moreover, the proposed law is so constructed so as to provide for the actual occurrence of the disease, whether as a result of negligence or in spite of the utmost care.

9. I cannot understand why the Board of Health should furnish preventives when you say that they must be *fresh*.

*Ans.*—The Board of Health would not send solutions, but only, in a bottle, such a quantity of the crystals of silver nitrat or of the argyrol or protargol as would make the specified strength of solution when a specified quantity of distilled water was added. I do not believe it necessary to state in the law that the Board of Health should not include the water. However, were it thought desirable, one could add after "prophylactic substances" the following parenthetical matter—(minus the water). One (or, if the Board should so choose), a dozen 1-drachm vials, each containing the proper quantity of crystals or of powder, and labeled with simple instructions, could be sent in a tiny wooden box to each and every physician in a populous state at a very small expense. This proceeding would bring the ophthalmia neonatorum law to the attention of the family doctor far more forcibly and memorably than a very large number of circulars. After one such shipment, the physician would, presumably, be able to supply the prophylactic to himself. The great and peculiar value of the shipment, however, would be its educative effect.

10. Where does the money go to carry out the provisions?

*Ans.*—I suppose that what is meant is not "go" but "come from." If so, I would say that the law, as proposed, declares explicitly "from the treasury of the state"—i. e., from the general fund. Some of the states already have this provision. If, however, in any of the other states, the legislature should object to the appropriation of one or two thousand dollars from the general tax fund for so extremely important a pur-

pose (which would not be likely), then some other arrangement could be made with the legislature, or, as a last resort, Sections 7 and 8 of the law could be stricken out. It should, of course, be made very clear to the legislature that the law in question would, by preventing blindness, with its consequent necessity for much free instruction of the blind, etc., save to the taxpayers of the state many times the cost of this very valuable provision of the law.

11. In Section 9 you say that copies of the Act shall be posted in all maternity homes, etc., yet, in Section 10, you say that "all reports and records made under this Act shall be kept from the public." (Substantially the same question was asked by three correspondents.)

*Ans.*—The Act and the reports and records which are made in pursuance thereof are not the same. There is no contradiction here at all.

12. Are not the penalties provided altogether too light?

*Ans.*—The Section referred to is No. 13. The penalties range from light to heavy—just as, to my thinking, they should. "Circumstances alter cases." Moreover, if penalties are extremely heavy, there is a tendency on the part of juries to return verdicts of "not guilty," whatever the evidence may have been.

I now wish to say, by way of a criticism of my own, that, in Section 2, the subdivision which is numbered "2" and the paragraph following, should run as follows:

2. Two drops of an absolutely fresh twenty-five to forty per cent solution of argyrol in distilled water.

3. Two drops of an absolutely fresh twenty-five to forty per cent solution of protargol in distilled water.

THOMAS HALL SHASTID, M. D.  
Superior, Wisconsin.

## BIOGRAPHIC NOTICES.

FLORENCE MAYO SCHNEIDEMAN, M. D.

PHILADELPHIA.

These include mention of ophthalmologists whose deaths occurred before the beginning of the present year, with the more important details regarding their lives that it has been possible to collect from the literature. Those whose deaths have occurred since January 1st, 1918, will be found mentioned in the department of News Items; and Biographic Sketches of those whose lives are of especial interest to ophthalmologists will be published from time to time in these pages.

ARLT, F. RITTER V., of Vienna, son of the famous von Arlt, died during the latter half of the year.

BEARDSLEY, CHARLES E., of Ottawa, Ohio, a specialist on diseases of the eye, ear, nose and throat, surgeon of the Twenty-first Ohio Volunteer Infantry, during the Civil War, died June 26th, from heart disease, aged 82.

BOCK, EMIL, born in 1857 in Galicia, and a worker for several years under Stellwag von Carion, died during the latter half of the year in Laibach, where he had settled in 1889 as an ophthalmic surgeon. He was a prolific writer and greatly interested in music and the fine arts.

BROWNE, EDGAR A., died June 27th, aged 75 years, the eldest son of Hablot K. Browne ("Phiz") who illustrated

many of Dickens's earlier works, was born in London. He received his earlier education at Bruce Castle School and studied medicine at St. Thomas's Hospital. In 1864 he took the diplomas M. R. C. S. and L. M., and L. S. A. in 1865; and established himself in general practice in Liverpool.

He was soon appointed surgeon to St. George's Hospital for Skin Diseases, and assistant surgeon to the Eye and Ear Infirmary, devoting himself thereafter exclusively to eye work. In 1884 he became lecturer on ophthalmology in the University of Liverpool, a position he retained until shortly before his death. In 1907, he received from the University the degree of M. Ch. He was president of the Section of Ophthalmology of the an-



nual meeting of the British Medical Association in 1912.

Mr. Browne was the author of "How to Use the Ophthalmoscope," and (jointly) of a "Manual of School Hygiene." Most of his articles on Eye Subjects appeared in the Transactions of the Ophthalmological Society, or in the pages of the Ophthalmic Review or the Liverpool Medico-Chirurgical Journal. In 1900-2 he was president of the Liverpool Medical Institution. His artistic powers were of no mean order, and were put to good use in his lectures and demonstrations. Few had his power of rendering a dry subject attractive to his listeners. He was richly endowed with ready wit, and was a most humorous public speaker. He retired from practice in 1915.—(Brit. Jour. Ophthal. v. I., p. 589.)

CAFFEY, HUGH B., of Pittsburg, Kansas, a Fellow of the American Medical Association, and American Academy of Ophthalmology and Oto-Laryngology, First Lieutenant M. R. C., U. S. Army, died April 16th from brain tumor, shortly after operation, aged 37 years.

CAMPOS, of Cairo, Egypt, officer in the army, was killed in action October 17th, 1915.

COLEMAN, W. FRANKLIN, formerly professor of ophthalmology in the Post Graduate Medical School of Chicago, died during the first half of the year at the age of 79. He was born in Canada, and held British qualifications. He first practiced in Toronto and then in St. John, N. B., and finally went to Chicago in 1855. He wrote extensively upon electricity in eye, ear, nose and throat work, upon which subjects he published a book in 1912. He was a charter member of the Chicago Ophthalmological Society, and its President for the year 1898.

COUTO, A DA GRAÇA, Professor of Ophthalmology at the University of Rio de Janeiro and director-general of the public health service, died during the year, aged 53 years.

CRAIG, WILLIAM GIBSON, of Springfield, Mass., member of the American Ophthalmological Society, ophthalmic and aural surgeon to Mercy Hospital, Springfield, died at his home, Nov. 15th, aged 49 years.

DELENS, E., honorary surgeon of the hospitals of Paris, Professeur Agrégé in the Faculty of Medicine, died at Versailles the latter half of the year, aged 78. He early abandoned general surgery to devote himself exclusively to ophthalmology. In 1886 he was given an independent ophthalmologic service at the hospital Lariboisière, which position he retained until his retirement in 1903. He was the author, in the surgical treatise of Duplay and Reclus, of a monograph which formed a valuable summary of ocular pathology; a second edition of this work appeared in 1900.—(Archiv. d'Optht., v. 35, p. 704.)

ERB, HORACE B., of Allentown, Pa., Medico-Chirurgical College of Philadelphia, 1888, a specialist in diseases of the eye, ear, nose and throat, died at his home, Jan. 24th, from pneumonia, aged 58 years.

EVE, LT.-COL., SIR FREDERICK S., died in London, Dec. 15th. He was a general surgeon of high repute, and was once ophthalmic house surgeon to St. Bartholomew's Hospital; and from 1888 to 1889 lecturer on ophthalmic surgery at the London Hospital. He was knighted in 1911. At the time of his death, Eve was Vice-President of the Royal College of Surgeons of England.

FARNSWORTH, DEXTER BOYLSTON, of Springfield, Mo., a specialist in diseases of the eye, ear, nose and throat, died at his home Jan. 22nd, aged 67 years.

FARQUAHARSON, HENRIETTA MAY, died in Chicago, during the early part of the year, aged 54 years.

FISHER, ROY GAVIN, of Tucson, Arizona, formerly professor of ophthalmology in the Chicago Eye, Ear, Nose and Throat College, died Dec. 26, 1916, aged 33.

FORD, FRANK ALBERT, of Altoona, Pa., a specialist on diseases of the eye, died at his home, Feb. 10th, aged 40.

FRAENKEL, A., the discoverer of the pneumococcus of pneumonia, died during the latter half of 1916 at the age of 68 years.

FRANCAVIGLIA, F., the well known Sicilian ophthalmic surgeon, died during the first half of the year, from cerebral hemorrhage, aged 74 years.

FROELICH, CONRAD, died of pneumonia during the latter half of the year in Berlin, at the age of 67 years.

GOLDZIEHER, Prof., died at the age of 67, June 15, 1916. He was born at Kőpcsény (Hungary), studied in Vienna and Heidelberg, in which last city he served as assistant to O. Becker. He took part in the campaign of 1870-71. He settled in Budapest in 1875, wrote the first Hungarian text book of ophthalmology (1890), and edited the *Szemészeti Lapok*. He was a gifted clinical observer, and was probably the first to describe the affections commonly known as "Parinaud's conjunctivitis," "Retinitis circinata," and "v. Hippel's disease."—(Brit. J. O. v. I, p. 654.)

GUILLOZ, THEODORE, born 1867, died during the latter half of 1916. He was a pupil of the distinguished French *savant* Augustin Charpentier (*Y. B.* v. 13, p. 418). At one time he was much occupied with questions of physiologic optics and was one of the first to obtain good photographs of the eye ground. After the discovery of the X-rays in 1896, he devoted himself to radiography; and founded, at the University of Nancy, the departments of electrotherapeutics and radiography; he was himself an early victim of the roentgen rays.—(Brit. J. O. v. I, p. 272.)

HANSON, EDWARD MATHEW, of Keokuk, Iowa, eye, ear, nose and throat surgeon to Graham Hospital, Keokuk, professor of electrotherapeutics in Keokuk Medical College of Physicians and Surgeons, who had been suffering from a nervous breakdown, died, aged 49, in St. Louis, Dec. 11th, from the effects of carbolic acid, self administered, it is believed, with suicidal intent.

HICKMAN, HERBERT VIGERS, M. B. Lond., formerly ophthalmic assistant at Guy's Hospital, died during the latter half of 1916.

HIRSCH, CAMILL, Privatdozent in Ophthalmology in Prag, who wrote on many clinical subjects, papers published in the German ophthalmic and general medical journals, died during the latter part of the year.

HOGSETT, C. G., died during the latter half of the year at Fort Worth, aged 44 years.

JESSOP, WALTER HAMILTON HYLTON, born in 1853, the son of Walter Jessop, F. R. C. S. of Cheltenham, England, died Feb. 16th, from pneumonia. He was educated at Cheltenham College, at Bedford School, and later at Gonville and Caius College, Cambridge, which he entered with a Tancred Studentship. After obtaining the B. A. degree in 1876, he entered as a student at St. Bartholomew's, becoming M. R. C. S. in 1880 and F. R. C. S. in 1884, and M. B., Cambridge, in 1886. He was ophthalmic house surgeon under Henry Power and Bowater Vernon, and took up the eye as his line of practice.

He had been elected surgeon to the Central London Ophthalmic Hospital and Ophthalmic Surgeon to the Paddington Green Hospital for children. On the retirement of Mr. Power in 1894, he was elected ophthalmic surgeon to St. Bartholomew's Hospital. As a teacher he was not fluent, but his methods were appreciated. He had a bent toward sarcasm, but could be tolerant of fools. As a writer he was not prolific, but some good work stands to his credit, notably his research into the action of cocaine when it was first introduced, and his Hunterian Lectures at the Royal College of Surgeons in 1887-8 on Anatomy and Physiology of the Intraocular Muscles. His other contributions were chiefly clinical.

In 1915 he was elected President of the Ophthalmological Society of the United Kingdom. To him is largely due the founding of the new *British Journal of Ophthalmology* by amalgamation of the existing journals, namely: the Royal London Ophthalmic Hospital Reports, the Ophthalmic Review, and the Ophthalmoscope. He was appointed managing director of the new journal, living long enough to see it successfully launched. His love of art was genuine and enthusiastic; his knowledge, judgment and taste were good. On the continent he was a representative figure of British ophthalmology, being a member of most of the foreign societies of ophthalmology, of which he was a frequent attendant. He lived the free life of the country whenever he could get away from his work, and took his full share as

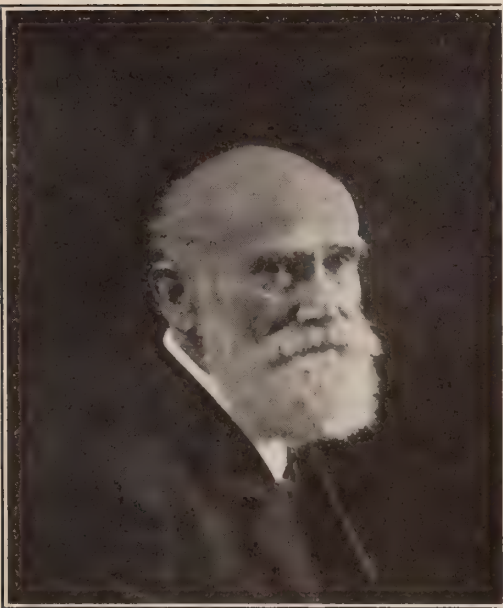


a country magistrate, and in other ways in the social life of his neighborhood.—(Brit. J. O. v. I, p. 213.)

KNAGGS, CAPT. F. H., R. A. M. C., Huddersfield, died during the first half of the year. On joining the R. A. M. C. he became ophthalmic and aural surgeon at the Huddersfield Infirmary and War Hospital.

KOONTZ, ALEXANDER FERGUSON, of Irvington, N. Y., since 1896 assistant surgeon to the Manhattan Eye, Ear and Throat Hospital, died in the Rockefeller Institute Hospital, March 5th, from pneumonia.

KRÜGER, Dr., of Frankfort, Germany, died during the latter half of the year.



Theodor Leber. 1840-1917.

LEBER, THEODOR, born Feb. 29, 1840, at Carlsruhe, died on April 7, 1917, at Heidelberg. In 1865 he published his first important work, dealing with the blood vessels of the human eye, the material for which he had gathered in the laboratory of Karl Ludwig in Vienna. For some years he was assistant to R. Liebreich in Paris. Leber worked with von Graefe for nearly four years; and in a very real sense may be said to have continued the life work of his master. Much of his work dealt with physiologic and pathologic problems. He was an in-

spiring teacher and a most acute clinical observer. His name is well known in connection with leukemic retinitis, the ocular complications of diabetes mellitus, conjunctivitis petrificans, and especially with hereditary neuritis and atrophy (Leber's disease). Abundant evidences of his clinical acumen are to be found in Leber's contributions to the Graefe-Saemisch Handbuch and *Graefe's Archiv für Ophthalmologie*, of which he was one of the editors. In 1896 he was awarded the Graefe Prize of the ophthalmological society of Heidelberg. His scientific contributions number upward of one hundred.—(Brit. J. O. v. I, p. 648.)

LIEBREICH, RICHARD, died in Paris during the early part of the year at the ripe age of 87. His name calls to mind among ophthalmologists the remembrance of a justly celebrated ophthalmoscope and his atlas of the fundus oculi. In the world of art, he was a learned and original investigator. From 1854 to 1862 he was von Graefe's principal assistant. At once recognizing the great importance of Helmholtz's invention and its clinical application, he substituted for the superposed glass plates of the great physicist, a perforated concave mirror mounted upon a convenient handle, adding correcting lenses as well as convex lenses for the inverted image. He learned to recognize and interpret the appearances till then entirely unknown, of the normal and diseased fundus, rendering the latter accessible to all in an atlas which still preserves its original value.

He knew also how to apply the discoveries of Donders, to correct scientifically the errors of refraction and accommodation as well as those of convergence, though perhaps less successful with the latter. It appears that the great master Graefe and his pupil were not always in perfect harmony. It is certain that the former did not care to have near him men of the highest order of intellect. Accordingly, upon Liebreich's announcing that he intended to leave and establish himself in Paris, von Graefe encouraged the project warmly and offered him letters of recommendation which, however, the pupil refused, somewhat to the chagrin of the master. His



success in Paris was rapid and great. He was at once consulted by the Countess of Montijo, the mother of the Empress Eugenie, who was suffering from glaucoma; a successful iridectomy saved her sight, making the fortune of the oculist. His clinic drew crowds of patients and pupils, many of whom subsequently became famous. Leber and Laquer had both been his clinical chiefs.

Upon the outbreak of the war of 1870, he left Paris for London, where he was immediately given the excellent position of oculist to St. Thomas' Hospital. Some years later, he abandoned ophthalmology for the fine arts, sculpture and painting. His ambition was not to become a Raphael or Titian, but to rediscover the pigments with which the old masters painted their masterpieces. He thought to find the explanation of the strange vagaries into which the great English painters, Turner and Mulready, had fallen in old age by optical defects, astigmatism in the one, and yellow discoloration of the crystalline lens in the other. After acquiring a competence, he finally quitted London and returned to Paris. This time he installed himself upon the other bank of the Seine, becoming the intimate of artists, to whom he became a source of inspiration.—(Archiv. d'Opht. vol. 38, p. 508.)

MANFREDI, NICOLO, born in Boscomarengo, in 1836, died September 20, 1916. He studied in Paris, where he was an assistant in the Clinic of Desmarres. Returning to Turin he worked with Reymond, Sperino and Quaglino at Pavia. Later he founded a clinic at Pisa. His contributions to the literature extended from 1864 to 1892, covering many important subjects in pathology and clinical ophthalmology. He had suffered from progressive paralysis for a year before his death.

MARSH, HOWARD, Marion Sims College of Medicine, St. Louis, 1901, a specialist on diseases of the eye, ear, nose and throat, died at his home, Russell, Kan., Jan. 3rd, aged 45 years.

MASSELON, JULIEN, born in 1844 at Rouen, where he entered upon his first

medical studies, died during the first half of 1917. In 1871 he came to Paris, where he entered the clinic of de Wecker, and with this master he remained connected during his entire professional career. In 1872 he received the degree, writing his thesis upon Tobacco Amblyopia. From 1875 to 1877, he published in the *Annales d'Oculistique* a series of clinical lectures by de Wecker, which subsequently formed the basis of de Wecker and Masselon's *Ophthalmology*. In 1886 appeared his digest of *Surgical Ophthalmology*. In 1891 his manual of *Clinical Ophthalmology* in collaboration with de Wecker was published.—(Ann. d'Oculist, v. 154, p. 193.)

MAXWELL, PATRICK W., died March 10, 1917, from influenza, aged 61 years. He received his medical education at Edinburgh and Vienna, altho he practiced for many years in Dublin. He came of an old Ayrshire family. He was surgeon aurist to the Lord Lieutenant of Ireland, for his practice was not wholly confined to eye work. He was an Examiner in Ophthalmology in the Royal College of Surgeons, Ireland. Among the ophthalmic appointments held by him may be mentioned that of ophthalmic surgeon to Dr. Steeven's Hospital, to Jervis St. Hospital, and to the Royal Victoria Eye and Ear Hospital. He served as a counsellor of the Ophthalmological Society of the United Kingdom from 1900 to 1902, and from 1912 to 1915 filled the office of Vice-President. He published papers upon symblepharon, squint, accommodation and the operation of capsulotomy. One of his daughters is a member of the Ophthalmological Society of the United Kingdom, practices ophthalmology, and is at present in the service of the War Office at Malta. In 1916 she delivered the Mary Louisa Prentice Montgomery lectures.

MCCABE, EDWARD MICHAEL, Yale University, 1887, instructor in ophthalmology in his alma mater, ophthalmologist to the St. Francis Hospital Asylum, New Haven, died at his home, New Haven, Conn., June 7th, aged 53 years.

— (To be continued)

# NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. As these columns go to press on the 30th of the month contributors should send in their items by the 25th. The following gentlemen have consented to supply the News Item Editor with the news from their respective sections: Dr. James A. Black, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. A. E. Davis, New York City; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. George F. Keiper, La Fayette, Indiana; Dr. George H. Kress, Los Angeles; Dr. W. Holbrook Lowell, Boston; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. Geo. M. Waldeck, Detroit; Dr. Oscar Wilkinson, Washington. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered as well as all foreign countries. Volunteers are therefore needed and it is hoped that they will respond promptly to this call.

## DEATHS.

Dr. Read Jennings McKay, aged 75, died at his home in Wilmington, Delaware, on March 1st.

Mr. Fergus M. Ogilvie, F. R. C. S., consulting surgeon to Oxford Eye Hospital, died January 18th, of pneumonia.

Dr. Sulzer of Paris, one of the editors of the *Annales d'Oculistique*, died February 9th, of angina pectoris.

Dr. Homer Warren Thompson, aged 58, of Salem, Ohio, died at his home February 21st.

Edward A. Trommald, of Los Angeles and Long Beach, California, died on February 17th after a surgical operation.

Dr. Charles Smith Turnbull, of Philadelphia, died at his home, February 21st.

## CORRECTIONS.

In the discussion of Dr. A. W. Mason's paper on The Ophthalmoscope, Retinoscope and Pupillary Disc in Refraction, page 129 of the *American Journal of Ophthalmology* he is quoted as saying "I took ten cases and refracted them." This should read "I took one hundred cases and refracted them with the results reported in the *Ophthalmic Record*, 1912."

In the discussion of Dr. M. M. Cullom's paper on "Removal of Tonsils for Recurrent Iritis" in the *American Journal of Ophthalmology*, February, page 136, the discussion credited to Dr. Eulaney, Madison, properly belongs to Dr. O. Dulaney, Dyersburg, Tennessee.

## PERSONALS.

At a recent meeting of the Galveston County Medical Society Dr. Henry C. Haden was elected president.

The practice of the late Dr. Homer W. Thompson, of Salem, Ohio, is offered for sale.

Dr. Austin A. Hayden, of Chicago, has been confined to St. Joseph's Hospital, with an attack of acute nephritis.

Dr. Francis Lane, of Chicago, is convalescing from an acute illness; he was in St. Luke's Hospital for a week.

Dr. Brown Pusey, of Chicago, is in St. Luke's Hospital, making a satisfactory recovery after a recent gall-bladder operation.

Dr. A. M. Hall, of Chicago, has been appointed a member of one of the local medical advisory boards.

Doctor Chas. E. Hammett, of Washington, D. C., has recently been appointed Clinical Professor of Ophthalmology in Georgetown University.

Dr. Gourfein has been appointed successor to the late Professor Haltenhoff, of Geneva.—(*British Jour. Ophthal.*)

Dr. L. C. Peter of Philadelphia has been appointed to succeed the late Wendell Reber as Professor of Ophthalmology in Temple University.

Professor St. Bernheimer, of Innsbruck, has been nominated to succeed Professor Ernest Fuchs, in Vienna. Fuchs (who is in good health) will devote his leisure to research work.—(*British Jour. Ophthal.*)

Lieut.-Col. R. H. Elliot, I. M. S., (retired), has been elected a member of the Council of the British Medical Association, to represent the Indian Medical Service, and Chairman of the Naval and Military Committee of the Association.—(*British Jour. Ophthal.*)

The scientific societies of Cuba recently presented a gold medal to Dr. Juan Santos Fernandez, of Havana, on the occasion of his seventieth birthday. The *Academia de Ciencias*, of which he was president, devoted a special meeting to the ceremony of presentation.

## COMING MEETINGS.

Ophthalmological Society of the United Kingdom, London, May 2-4.

Société d'Ophthalmologie de Paris, May 6th, Paris, 51 Rue de Cligny.

Section on Ophthalmology, American Medical Association, Chicago, June 11-14.

American Ophthalmological Society, Eastern Point, New London, Conn., July 9, 10.

Oxford Ophthalmological Congress, Oxford, England, July 10-12.

American Academy Ophthalmology and Otolaryngology, with the Fourth Colorado Ophthalmological Congress, Denver, Colo., August 6, 7, 8.

Pacific Coast Oto-Ophthalmological Society, Salt Lake City, Utah, August 12, 13.

## SOCIETIES.

At the mid-year meeting of the Eye, Ear, Nose and Throat Section of the Indiana State Medical Association, held in Indianapolis, March 6th and 7th, the members of the Section voted to organize "The Indiana Academy of Ophthalmology and Oto-Laryngology." The organization of this special society fills a long felt want and it is the hope of the officers of the Indiana Academy to ultimately hold monthly or bi-monthly meetings. The officers of the Academy are Dr. John R. Newcomb, president; Dr. Wm. S. Tomlinson, vice-president; Dr. E. M. Shanklin, secretary-treasurer.

The program of the March 6th meeting of the Chicago Medical Society was a symposium on medical problems connected with the draft. Major Wm. H. Wilder gave an interesting paper on the subject, from the standpoint of the ophthalmologist. He called particular attention to the care which must be exercised to detect malingerers. At Camp Taylor, where Major Wilder was on duty, a man had been qualified by his local examiner, but when examined at the Camp was found to have a glass eye. Three drafted men who were anxious to evade duty, were detected rubbing foreign matter into their eyes for the purpose of inducing inflammatory conditions which might be taken for trachoma. These three men, after being caught at it, were court-martialed, dismissed from the army, and sentenced to hard labor in prison, for three years.

## MILITARY NOTES.

Major George E. de Schweinitz, after more than four months' service in France, has returned to this country.

Capt. F. E. Woodruff, of St. Louis, has been transferred from the Aviation Camp at Mt. Clemens, Michigan, to Camp Wadsworth, Spartansburg, S. C.

Capt. James G. Calhoun, of St. Louis, has been ordered to Camp Funston to report for duty April 5th.

Dr. George F. Keiper, a colleague, who is serving as President of the Board of Education in La Fayette, Indiana, is also a member of the medical advisory board for his county.

Capt. Francis Lane has been transferred from the aviation examining unit in Chicago to the ophthalmologic department, base hospital, at Camp Grant, Rockford, Illinois.

Dr. Willis O. Nance, of Chicago, has entered the Medical Reserve Corps of the United States Army.

Major Gustavus I. Hogue is now in charge of the Eye Department, Base Hospital, Camp McClellan, Anniston, Alabama.

A dispatch from Havre reports that Dr. de Mets, a prominent Antwerp oculist, was shot by the Germans a short time ago.

Capt. W. F. Patten, of Washington, D. C., is Attending Surgeon Aviation Service, Episcopal Eye, Ear and Throat Hospital.

Capt. W. H. Huntington, of Washington, D. C., is stationed at the Walter Reed Hospital.

The Legion of Honor has been conferred on Dr. Louis Borsch, formerly of Philadelphia, in recognition of his services as eye surgeon at the French Military Hospital of Grand Papais in the Champs Elysees. The presentation was made by President Poincaré. In August, 1909, Dr. Borsch received the Royal Medal of the Italian Ministry of Public Instruction for his work in Ophthalmology.

According to recent news dispatches men in training at the Aviation School at North Island, near San Diego, have been ordered to turn in or destroy all goggles made by a certain firm. Some of the aviation students, among them Major John Purroy Mitchell, former Mayor of New York City, have reported that it was impossible to judge accurately of altitude and make a good landing while wearing these goggles; but that the difficulty disappeared as soon as the goggles were removed. The subject is under official investigation.

## MISCELLANEOUS.

The British Ophthalmic Hospital at Jerusalem, used by the Turks as an ammunition storehouse, was partly destroyed when they hastily evacuated the city. This hospital has been of immense benefit, not only to the residents of Jerusalem of all classes, but also to patients drawn from every part of Palestine.

Plans have been inaugurated for a campaign to raise \$25,000 for the South Baltimore Eye, Ear and Throat Hospital. The money raised will be used to enlarge the hospital and convert it into a general hospital.

"Collosol" Cocain is a new product made by the Crookes Laboratories, London, who claim that it retains its anesthetic action and loses its general toxicity. A recent contention has arisen over the product in which the claims of the makers are disputed.



# OPHTHALMIC LITERATURE.

Under this head continuing the "Index of Ophthalmology" heretofore published in **Ophthalmic Literature** will be found the subjects of all published papers received during the last month, that bear to an important extent upon ophthalmology. The subject is indicated rather than the exact title given by the author. Where the original title has been in a foreign language it is translated into English. The journal in which the paper is published will indicate the language of the original.

The names of the different journals are indicated by abbreviations which generally correspond to those used by the **Index Medicus**, the **Journal of the American Medical Association**, and the **British Journal of Ophthalmology**. We will from time to time publish the list of ophthalmic journals, with the abbreviations used for each. Often a single letter discriminates between journals published in different languages. Thus "Arch. of Ophth." refers to the Archives of Ophthalmology, published in English; "Arch. d'Opht.," indicates the French Archives d'Ophtalmologie; "Arch. de Oftal." refers to the Archivos de Oftalmologia Hispano-Americanos, while "Arch. di Ottal." indicates the Italian Archivio di Ottalmologia.

In this index of the literature the different subjects are grouped under appropriate heads; so that all papers bearing on the same, or closely related subjects, will be found in one group. The succession of the groups is the same from month to month, and identical with that of the Digest of the Literature. Where a paper clearly refers to two subjects that belong in different groups, it will be noticed in both groups.

Each reference begins with the name of the author in heavyface type. This is followed by the subject of his paper. Then in brackets a number with (ill.) indicates the number of illustrations, or a number with (pl.) the number of plates illustrating the article, (col. pl.) indicates colored plates. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that the paper was read before some society and gave rise to a discussion which is published with it.

The "repeated titles" may render accessible the essential part of a paper, the original of which could not be consulted. These give (in brackets) after the author's name the volume and page of this department of "Ophthalmic Literature" where the title of the paper will be found; and then the journal, volume, and page where the translation or abstract is published.

It is desired to notice every paper as soon as possible after it is published. Readers will confer a favor by sending titles they notice have been omitted, with journal and page of publication; and of their own papers, sending either a copy of the journal in which each appeared, or a reprint. These should be sent as soon as possible to 318 Majestic Building, Denver, Colorado.

## METHODS OF DIAGNOSIS.

**Elliot, R. H.** A Scotometer. *Brit. Jour. of Ophth.*, v. 2, p. 168.

**Wolfe, C. T.** The Eye as Index of Certain Diseases. *Kentucky Med. Jour.*, v. 16, p. 110.

## THERAPEUTICS.

**Basterra y Santa Cruz.** Ethylhydrocuprein in Ophthalmology. *Arch. de Oftal. Hispano-Amer.*, v. 17, p. 670.

**MacWhinnie, A. M.** Subconjunctival Injections. *New York Med. Jour.*, v. 107, p. 343.

## OPERATIONS.

**Elschnig, A.** Prevention of Postoperative Infections. *Graefe's Arch. f. Ophth.*, May, 1915. *Brit. Jour. Ophth.*, v. 2, p. 183.

## REFRACTION.

Cause and Prevention of Myopia. *Lancet*, Feb. 9, 1918, p. 240.

**Champlin, H. W.** Fitting of Glasses by the General Practitioner. Shall he do it? *Med. Summary*, v. 39, p. 359.

**Des Voeux, H. A.** Eye Strain and the General Practitioner. *Abst. Brit. Med. Jour.*, Feb. 16, p. 205.

**Dunn, J.** Headache the Result of Eye Strain. *Arch. of Ophth.*, v. 47, p. 146.

**Green, J., Jr.** Spectacles. *Ref. Handb. Med. Sc.*, 1917, v. 8, p. 634.

**Krebs, A.** Myopia with Marked Choroidal Degeneration. *Penn. Med. Jour.*, v. 21, p. 341.

**Mason, A. H.** Ophthalmoscope, Retinoscope and Pupillary Disc in Refraction. *Abst. Amer. Jour. Ophth.*, v. 1, p. 129.

**Masuda, J.** Myopia Statistics in Japan. *China Med. Jour.*, 1917, v. 31, p. 348.

**Minturn, R.** Points in Static Skiametry. *Optical Jour. and Rev. of Optom.*, v. 40, p. 273.

**Wilson, J. A.** Cause and Prevention of Myopia. *Lancet*, Feb. 16, p. 277.

## OCULAR MOVEMENTS.

- Guthrie, A. L.** Diagnostic Value of Nystagmus. Jour. Oklahoma State Med. Assn., v. 11, p. 91.
- Mann, R. H. T.** Early Correction of Squint. Jour. Arkansas Med. Soc., v. 14, p. 183.
- Tyson, H. H.** Traumatic Paralysis of Left Abducens Nerve. Arch. of Ophth., v. 47, p. 204.

## CONJUNCTIVA.

- Brav, A.** Treatment of Trachoma. Med. Rev. of Rev., v. 24, p. 149.
- Heckel, E. B.** Iced Normal Salt Solution in Gonorrheal Conjunctivitis. Penn. Med. Jour., v. 21, p. 337.
- Herron, J. T.** Treatment of Purulent Conjunctivitis. Jour. Tenn. State Med. Assn., v. 10, p. 445.
- Kirk, J.** Trachoma in the Straits Settlements. Brit. Jour. Ophth., v. 2, p. 135.
- McDaniel, F. L.** Trachoma. Jour. Kans. Med. Soc., Feb., 1918, p. 61.
- Mas and Magro.** Morphology of Trachoma Bodies. Siglo Med., v. 64, p. 964.
- Morax, V.** Parinaud's Conjunctivitis. Brit. Jour. Ophth., v. 2, p. 133.
- Stark, H. H.** Membranous Conjunctivitis of Over Four Years' Duration. (Dis. Bibl.) Amer. Jour. Ophth., v. 1, p. 91.
- Strickler, D. A.** Traumatic or Infectious Conjunctivitis. Colo. Ophth. Soc., Dec., 1917. Amer. Jour. Ophth., v. 1, p. 143.

## CORNEA AND SCLERA.

- Bonnefon.** Corneal Grafts. Lyon Chirurg., v. 14, p. 903. Jour. Amer. Med. Assn., v. 70, p. 576.
- Bruder, J.** Keratitis Profunda. Arch. of Ophth., v. 47, p. 201.
- Coulter, R. J.** Binocular Keratitis after Uniocular Injury. Brit. Jour. Ophth., v. 2, p. 139.
- Green, J., Jr.** Thermophor in Treatment of Pneumococcus Ulcer of Cornea. Southern Med. Jour., v. 11, p. 251. Abst. Amer. Jour. Ophth., v. 1, p. 135.
- Irwin, F. N.** Scleritis; Possible Tuberculous Origin. Arch. of Ophth., v. 47, p. 208.
- Key, B. W.** Extensive Ciliary Staphyloma. Arch. of Ophth., v. 47, p. 205.
- Knapp, A.** Corneal Suppuration in Exophthalmic Goiter. Arch. of Ophth., v. 47, p. 173.
- McCaw, J. A.** Sclero-corneal Tuberculosis. Colo. Ophth. Soc., Dec., 1917. Amer. Jour. Ophth., v. 1, p. 140.
- Magruder, A. C.** Staining Corneal Ulcers. Amer. Jour. Ophth., v. 1, p. 152.
- Renninger, A. R.** Corneal Ulcers. Penn. Med. Jour., v. 21, p. 296.
- Zentmayer, W.** Disciform Keratitis. Wills Hosp. Ophth. Soc., Dec., 1917. Penn. Med. Jour., v. 21, p. 341.
- Repeated Titles. **Santos Fernandez** (v. 1, p. 78). Jour. Amer. Med. Assn., v. 70, p. 740.

## UVEAL TRACT.

- Argañaraz, R.** Gyrate Atrophy of Choroid and Retina. (1 col. pl., 2 ill.) Arch. de Oftal., Hisp.-Amer., v. 17, p. 665.
- Bell, G. H.** Plastic Iritis. Arch. of Ophth., v. 47, p. 209.
- Cullom, M. M.** Removal of Tonsils for Recurrent Iritis. Tr. Sec. on Ophth., South. Med. Assn., Nov., 1917. Abst. Amer. Jour. Ophth., v. 1, p. 136.
- Hillegas, W. H.** Iritis. Hahnem. Mo., v. 53, p. 13.
- Hubbard, S. J.** Kerato-iritis. Arch. of Ophth., v. 47, p. 210.
- Jackson, E.** Causes of Iritis and Allied Inflammations. (Dis.) Colo. Med., v. 15, p. 63.
- Libby, G. F.** Traumatic Choroiditis and Probable Vitreous Hemorrhage. Colo. Ophth. Soc., Dec., 1917. Amer. Jour. Ophth., v. 1, p. 143.
- Steinbugler, W. F. C.** Dental Infection in Eye Diseases. (Bibl.) Arch. of Ophth., v. 47, p. 182.
- Stieren, E.** Iridocyclitis in Antrum Disease. Penn. Med. Jour., v. 12, p. 341.
- Woods, A. C.** Antigenic Properties of Uveal Tissue Shown by Complement Fixation. Arch. of Ophth., v. 46, p. 503. Abst. Amer. Jour. Ophth., v. 1, p. 126.
- Experimental Iridocyclitis (2 pl., 3 Fig. Bibl.). Arch. of Ophth., v. 47, p. 161.

## GLAUCOMA.

- Allport, F.** Iridodiasis in Glaucoma. Ill. Med. Jour., v. 33, p. 155. Med. Rev. of Rev., v. 24, p. 144.
- Bailliant, M. P.** Arterial and Intraocular Pressure. Annales de Méd., v. 4, May-June, 1917, p. 328.
- Carr, A. M.** Normal Intraocular Tension not Lowered by Narrowing of Pupil. Arch. of Ophth., v. 47, p. 177.
- Claiborne, J. H.** Iridectomy for Glaucoma. Arch. of Ophth., v. 47, p. 206.
- Clapp, C. A.** Corneo-scleral Trephining. Amer. Jour. Ophth., v. 1, p. 94.
- Gifford, H.** Glaucoma from Absorption of Senile Cataract. (Dis.) Amer. Jour. Ophth., v. 1, p. 83.
- Markel, J. C.** Glaucoma. Penn. Med. Jour., v. 21, p. 341.
- Posey, W. C.** Indications for Operation in Glaucoma. (Dis.) Penn. Med. Jour., v. 21, p. 290.
- Repeated Titles. **Feingold** (v. 1, p. 220). Amer. Jour. Ophth., v. 1, p. 132.

## CRYSTALLINE LENS.

- Black, M.** Results 26 Years After Cataract Operation. Colo. Ophth. Soc., Dec., 1917. Amer. Jour. Ophth., v. 1, p. 142.
- Fisher, J. H.** Atropin in Cataract Extraction. Brit. Jour. Ophth., v. 2, p. 186.
- Higgins, C.** Spontaneous Cure of Cataract. Lancet, Feb. 23, p. 296.



**Ruiz, J. M.** Preliminary Suture in Cataract Operation. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 690.

**Schwenk, P. N. K.** Congenital Cataract. *Wills Hosp. Ophth. Soc., Nov.*, 1917. *Amer. Jour. Ophth.*, v. 1, p. 144.

**Weber, F. P.** Mongolianism with Congenital Cataract. *Brit. Jour. Child. Dis.*, v. 14, p. 267.

#### VITREOUS.

**Elliot, R. H.** Changes in Vitreous from Penetrating Septic Wounds (Couching). *Roy. Soc. Med. Sec. on Ophth.*, Feb. 6, 1918. *Lancet*, Feb. 16, p. 260.

**Harrison, W. G.** Traumatic Intraocular Hemorrhage. *Sec. on Ophth., South. Med. Assn.*, Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 132.

#### RETINA.

**Black, M.** Massive Retinal Exudate. *Amer. Jour. Ophth.*, v. 1, p. 120.

**Burkholder, C. A.** Hole at Macula. (1 pl., 1 ill. Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 81.

**Hall, W. S.** Physiology of Vision. *Ref. Handb. Med. Sc.*, 1917, v. 8, p. 450.

**Jones, E. L.** Relation of Retinitis Pigmentosa and Allied Conditions to Ductless Glands. *Amer. Jour. Ophth.*, v. 1, p. 107.

**Mack, C.** Hole in Retina at Macula. *Arch. of Ophth.*, v. 47, p. 206.

**Martin, H. H.** Retino-choroiditis Juxtapapillaris. *Sec. on Ophth., South. Med. Assn.*, Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 132.

**Ormond, A. W.** Observation of Fundus Oculi During Temporary Blindness. *Med. Press*, Feb. 13, p. 129. *Lancet*, Feb. 16, p. 260.

**Paton, L.** "Gunn's Dots." *Brit. Jour. Ophth.*, v. 2, p. 188.

**Shafer, J. J.** Diabetic Retinitis. *Amer. Jour. Surg.*, v. 32, p. 67.

**Wallace, F. E.** Probable Retinal Tuberculosis. *Colo. Ophth. Soc.*, Dec., 1917. *Amer. Jour. Ophth.*, v. 1, p. 144.

**Wootton, H. W.** Retinitis Proliferans in Diabetic Subject. *Arch. of Ophth.*, v. 47, p. 208.

Retinal Detachment. *Arch. of Ophth.*, v. 47, p. 207.

Repeated Titles. **Schevensteen** (v. 1, p. 221). *Brit. Jour. Ophth.*, v. 2, p. 156.

#### OPTIC NERVE.

**Hubbard, S. J.** Optic Neuritis of Accessory Sinus Disease. *Arch. of Ophth.*, v. 47, p. 206.

**Stilwill, H. R.** Primary Optic Atrophy. *Colo. Ophth. Soc.*, Dec., 1917. *Amer. Jour. Ophth.*, v. 1, p. 141.

#### VISUAL TRACTS AND CENTERS.

**Downey, J. E., and Payson, E. B.** Unidexterity and Mirror-reading. *Jour. Exp. Psychol.*, v. 2, No. 6.

**Holmes, G.** Disturbances of Vision by Cerebral Lesions. *Abst. Arch. of Ophth.*, v. 47, p. 195.

**LeMere, H. B.** Ocular Lesions in Intracranial Growths. *Neb. State Jour. Med.*, v. 3, p. 59.

**Walker, C. B., and Cushing, H.** Chiasmal Lesions and Homonymous Hemianopsia with Hypophyseal Tumor (19 ill.). *Arch. of Ophth.*, v. 47, p. 119.

#### COLOR VISION.

**Gibson, C. R.** Explanation of Color and Color Vision. *Glasgow Med. Jour.*, v. 89, p. 1.

**Malling, B.** Color Perception. *Norsk Mag. for Laegevid.*, v. 79, p. 1. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 742.

**Rheinberg, J.** Appearances of Color Spectra to Aged. *Nature*, 1917, v. 100, p. 204. Repeated Titles. **Berry** (v. 1, p. 221). *Brit. Ophth.*, v. 2, p. 152.

#### LACRIMAL APPARATUS.

**Friberg, T.** Drainage of Tears and Modern Tear Sac Operations. *Zeit. f. Augenh.*, March, 1917. *Abst. Brit. Jour. Ophth.*, v. 2, p. 173.

#### LIDS.

**Bell, G. H.** Senile Keratosis of Upper Lid. *Arch. of Ophth.*, v. 47, p. 202.

**Bruder, J.** Gumma of Left Lower Lid. *Arch. of Ophth.*, v. 47, p. 201.

**Cary, E. H.** Repair of Tarsus. *Sec. on Ophth., South. Med. Assn.*, Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 133.

**Cuénod, A.** Ciliary Blepharitis. *Rev. Med.*, 1917, v. 25, p. 71.

**Federici, N.** Palpebral Ptosis with Gout. *Rev. Med.*, v. 25, p. 71.

**Hyman, C. H., and Leary, T.** Normal (Beef) Serum in Treatment of Anthrax. *Boston Med. and Surg. Jour.*, v. 178, p. 318.

**Posey, W. C.** Coloboma of Lids. *Wills Hosp. Ophth. Soc.*, Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 145.

**Shaffner, P. F.** Chancre of Lid (1 ill.). *Jour. Amer. Med. Assn.*, v. 70, p. 676.

#### ORBIT.

**Dodd, O.** Unilateral Exophthalmos. *Chicago Ophth. Soc.*, Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 140.

**Golovine, S. S.** Ligature of Superior Ophthalmic Vein for Pulsating Exophthalmos. *Vestnik Ophth.*, Nov., 1917. *Brit. Jour. Ophth.*, v. 2, p. 174.

**Key, B. W.** Pulsating Exophthalmos. *Arch. of Ophth.*, v. 47, p. 210.

**Knapp, A.** Surgical Treatment of Corneal Suppuration in Exophthalmos. *Arch. of Ophth.*, v. 47, p. 173.

**Posey, W. C.** Operation for Contracted Orbit. *Wills Hosp. Ophth. Soc.*, Dec., 1917. *Penn. Med. Jour.*, v. 21, p. 342.

**Roberts, E. R., and Harris, T. J.** Empyema of Ethmoid and Frontal Sinus; Perforation into Orbit. *Laryngoscope*, v. 38, p. 93.

**Steim, J. M.** Orbital Complications in Ethmoid Disease. *Abst. Penn. Med. Jour.*, v. 21, p. 341.

**Symmers, D.** Idiopathic Cardiopathy and Exophthalmic Goiter. *Arch. of Int. Med.*, v. 21, p. 337.



**Terson, A.** Tenonitis from Rheumatism and Gout. *Paris Méd.*, v. 18, p. 391.

#### PARASITES.

Repeated Titles. **Pacheco Luna.** (v. 1, p. 159.) *Amer. Jour. Ophth.*, v. 1, p. 122.

#### TUMORS.

**Bell, G. H.** Sarcoma of Orbit. *Arch. of Ophth.*, v. 47, p. 207.

**Forman, J., and Hugger, C. C.** Melanoblastomas of Eye. (11 ill. Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 97.

**Castresana, B.** Congenital Dermoid of Lid. (1 ill.) *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 682.

**James, R., and Trevor, R. S.** Hemangioma of Palpebral Conjunctiva Forming Pedunculated Tumors. *Brit. Jour. Ophth.*, v. 2, p. 129.

**Jansson, G.** Bilateral Exophthalmos Caused by Tumor of Orbit. *Finska Lak-Sällsk Handl.*, 1917, v. 59, p. 965.

**Pfingst, A. O.** Tumors of Lacrimal Gland. *Sec. on Ophth.*, South. Med. Assn., Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 131.

**Posey, W. C.** Extensive Epithelioma of Orbit. *Wills Hosp. Ophth. Soc.*, Dec., 1917. *Penn. Med. Jour.*, v. 21, p. 342.

**Zentmayer, W.** Tumor of Antrum—Cataract. *Wills Hosp. Ophth. Soc.*, Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 145.

#### INJURIES.

**Black, M.** Traumatic Dislocation of Lens. *Colo. Ophth. Soc.*, Dec., 1917. *Amer. Jour. Ophth.*, v. 1, p. 141.

**Hoeve, van der, J.** Iron Fragment in Eye-ball. *Nederl. Tijd. v. Geneesk.*, Nov., 1917, p. 1879. *Jour. Amer. Med. Assn.*, v. 70, p. 895.

**Key, B. W.** Extensive Penetrating Wound of Globe. *Arch. of Ophth.*, v. 47, p. 204.

**McReynolds, J. O.** Minute Foreign Bodies in Eye. *Texas State Jour. Med.*, v. 13, p. 355.

**Nishimura, M.** Ammonia and Acids; Action on Eye. *China Med. Jour.*, 1917, p. 349.

**Orendorff, O.** Removal of Bullet Embedded in Orbit Ten Years. (2 Ill. Dis.) *Amer. Jour. Ophth.*, v. 1, p. 114.

**Pockley, G. A.** Perforating Injuries of Eye-ball by Magnetizable Bodies. *Med. Jour.*, Australia, Jan., 1918, p. 66.

**Pontius, P. J.** Shot Injury. *Wills Hosp. Ophth. Soc.*, Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 145.

**Posey, W. C.** Injury to Eyes from Lightning Stroke. *Amer. Jour. Ophth.*, v. 1, p. 88.

**Spencer, F. R.** Steel in Orbit. *Colo. Ophth. Soc.*, Dec., 1917. *Amer. Jour. Ophth.*, v. 1, p. 142.

Repeated Titles. **Roy** (v. 1, p. 160). *Amer. Jour. Ophth.*, v. 1, p. 130.

#### GENERAL DISEASES.

**Andrews, B. F.** Ocular Manifestations of Reflex Origin. *Chicago Ophth. Soc.*, Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 137.

**Brose, L. D.** Ocular Tuberculosis. *Jour. Ind. State Med. Assn.*, v. 11, p. 113.

**Cohen, M.** Eye Manifestations in Polycythemia. *Arch. of Ophth.*, v. 47, p. 192.

**Fuller, S. C., and Chambers, R. M.** Adrenalin Mydriasis, a Symptom of Dementia Precoxa. *Dementia Precoxa Studies*, Jan., 1918, p. 31.

**Hertel, E.** Eye Symptoms in Weil's Disease. *Graefe's Arch. f. Ophth.*, v. 94, Pt. 1. *Abst. Brit. Jour. Ophth.*, v. 2, p. 154.

**Mougeot, A., and Duverger.** Oculo-cardiac Reflex and Bradycardia. *Presse Méd.*, v. 25, p. 72. *Jour. Amer. Med. Assn.*, v. 70, p. 658.

**Smith, H. A.** Temperature Curve in Early Intraocular Tuberculosis. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 116.

**Spencer, F. R.** Role of Ductless Glands in Ophthalmology. (Dis.) *Colo. Med.*, v. 15, p. 411. *Amer. Jour. Ophth.*, v. 1, p. 100.

**Vandegrift, G. W.** Syphilitic Manifestations of Oculomotor Nerve. *Int. Jour. Surg.*, v. 31, p. 41.

Repeated Titles. **Moret** (v. 1, p. 221). *Brit. Jour. Ophth.*, v. 2, p. 157. **Weekers and Firket** (v. 1, p. 80). *Brit. Jour. Ophth.*, v. 2, p. 141.

#### COMPARATIVE OPHTHALMOLOGY.

**Fujita, S., and Takita, C.** Exophthalmos in Fresh Water Fish. *China Med. Jour.*, 1917, v. 31, p. 349.

#### HYGIENE.

Causes of Eye Strain (Editorial). *Boston Med. and Surg. Jour.*, v. 178, p. 402.

**Davis, A. E.** Care of Eyes. *Medical Insurance and Health Conservation*, v. 27, p. 228.

**Ferro, P. B.** Hygiene of Eyes. *Semana Med.*, Buenos Aires, v. 24, p. 517. *Jour. Amer. Med. Assn.*, v. 70, p. 819.

**Jelliffe, S. E., and Brink, L.** Eyes of Youth. *Med. Rec.*, v. 93, p. 366.

#### PROFESSIONAL RELATIONS—EDUCATION—HISTORY.

**Alt, A.** The American Journal of Ophthalmology. *Amer. Jour. Ophth.*, v. 1, p. 148.

**Coulter, R. J.** Medico-legal Interest of Binocular Keratitis Following Unilateral Injury. *Brit. Jour. Ophth.*, v. 2, p. 139.

**Ginestous, E., and Dominique, C.** Re-education of Blind Soldier. *Prog. Méd.*, 1917, v. 32, p. 176.

**Lapersonne, F. de.** Ophthalmic Organization in Army. *Arch. d'Opht.*, v. 35, p. 452.

**Loeb, C.** The Annals of Ophthalmology. *Amer. Jour. Ophth.*, v. 1, p. 148.

**Savage, G. C.** The Ophthalmic Record. *Amer. Jour. Ophth.*, v. 1, p. 149.

**Schock, L. E.** Minor Eye Injuries and Workmen's Compensation Law. *Penn. Med. Jour.*, v. 21, p. 278.

Qualifications in Ophthalmic Surgery. *Brit. Jour. Ophth.*, v. 2, p. 147.

**Taylor, H. H.** Visual Standards for British Army. *Brit. Jour. Ophth.*, v. 2, p. 185.

Welfare of Blind. *Brit. Jour. Ophth.*, v. 2, p. 149. *Lancet*, Feb. 23, p. 318.

**Wilder, W. H.** Medical Problems Connected with Draft from Ophthalmologist's Standpoint. *Jour. Amer. Med. Assn.*, v. 70, p. 805.

# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 1

MAY, 1918

No. 5

## LEPROSY WITH ESPECIAL REFERENCE TO OPHTHALMOLOGIC FINDINGS.

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A review of the literature relating to the ocular lesions observed in leprosy; with a report of two cases, studied at the New Haven Hospital. With illustrations showing areas of anesthesia, and with a bibliography.

In the last ten years three sporadic cases of leprosy have been reported in the State of Connecticut. Recently a leper came to the clinic for a nose condition which was treated as a syphilitic lesion. On further examination acid-fast bacilli were found in the nasal secretion. The patient was then given a thorough investigation and classified as a case of leprosy of the maculo-anesthetic type. He also presented an eye condition which will be described in detail later. The diagnosis was confirmed by Dr. James A. Honeij. This patient was immediately isolated for further observation and study.

It is rather unusual that another case of the same type and stage of invasion should have been isolated at this institution at the same time. An opportunity was offered to study these cases in a well regulated isolation hospital. We have been able to compare carefully the various physical, anatomic and metabolic changes; and the infrequency of a full description in American literature and text-books on ophthalmology of the ocular changes found in leprosy, has prompted me to present these cases.

Leprosy is a chronic communicative disease caused by the bacillus *lepra* of Hansen and in its evolution assumes two distinct forms—the nodular or *lepra tuberosa*, and anesthetic or nerve leprosy. The mixed type is a combina-

tion of the two forms. It is characterized by cutaneous and constitutional symptoms, alteration in all tissues as well as in bony and nerve structure, resulting in anesthesia, ulceration, necrosis, atrophy and frequently ending fatally. Bacilli resembling the typical acid-fast bacilli of leprosy have been found in the circulating blood and excretions by Honeij and other investigators frequently enough to make us believe that leprosy is a systemic disease and may at some period of its evolution affect any or all the units of the human body.

The eye, like the other organs of the body, is invaded by this disease but much less frequently and markedly. Lopez, in his study of the disease at the hospital of San Lazaro in Havana, notes that if we include in the study of the eye the adnexa tissues—the lids and lacrimal apparatus—every case has some ophthalmologic lesion during its course. Kaurin of Norway found that two-thirds, and even three-fourths of the lepers presented ocular lesions. Fernandez had the opportunity of seeing a great many ocular manifestations of leprosy. He believes that in many cases the eye is affected primarily, as evidenced by the great number of bacilli found in the superficial layers of the lesions. Many investigators (among them Espada) consider the ocular manifestations to be secondary in na-

ture and not primary. All authors agree, however, that the anterior segment of the eye is most frequently attacked.

Leprosy is probably known to many by the peculiar and characteristic physiognomy it sometimes assumes. The face is often the site of predilection for leprous nodules. They frequently mass in great numbers over this region and sometimes produce the leonine countenance. Because of infiltration the brows deeply overhang the orbit, the lids assume a state of ptosis, the nose and ears are enlarged, the lips thickened, the jowls massive and wrinkled. Lopez in his study of eighty cases notes that almost every leper, from the beginning of his illness, finds his eyelids attacked either by anesthetic patches or by nodules with deformity of the lids and with destruction also of the hair follicles. Grossman, from his observations in Iceland, finds that the nodular form of the disease (which is there the most common) is always attended with eye lesions unless the patient dies early. On the other hand, the anesthetic type may leave the eye and its adnexa unaffected. The nodular lesions often begin in the lids and later may attack the eyeball, although this is not always the case, and lesions of the eye frequently occur without marked outer changes.

The loss of eyelashes and eyebrows occurs quite early in the disease. Lopez explains this process of madarosis by the diminution of temperature and destruction of glandular elements of the tegumentary system. It commences in an anesthetic patch on the naked skin, which becomes dry and the function of the hair follicles destroyed. Hart presented a case of this description.

In five hundred cases of leprosy de Silva saw one hundred and one suffering from ocular lesions. Twenty-three of them were of the nodular type. He found facial paralysis in seven cases, which caused lagophthalmus. Lopez, in his cases, demonstrated that ectropion is a frequent occurrence. He differentiates the condition of ectropion found in senile individuals from that of leprosy in that the latter condition is

caused by a leprous plaque. This lesion is caused by a "leprous agency" which destroys the glandular elements in their turn, then attacks the terminal filaments and paralyzes the twigs of the seventh nerve and thus contributes to the palpebral eversion.

Honeij has noticed that the lacrimal duct became occluded, which necessitated occasional probing. This undoubtedly was caused by inflammatory processes. Morrow and Lee mention among eye symptoms excessive lacrimation which is followed by a marked xerosis, causing atrophic shrinking of the mucous membrane. This condition is true in many cases of leprosy because of the relaxation of the orbicularis palpebrarum, due to the paralysis of the facial nerve. The ectropion condition is caused by the leprous anesthetic plaque. Anesthesia of ocular and palpebral conjunctiva is frequent among all types of leprosy, and is almost constant in the anesthetic type.

Lopez notes that anesthesia, inflammation, pterygia and nodules are the outstanding manifestations of the conjunctival invasion. Through lid defects and anesthesia of the conjunctiva the exposed eye is often irritated by dust and substances in the air. In consequence of this an inflammatory condition is set up with marked congestion and mucoid discharge, followed, if unchecked, by chronic conjunctivitis. This goes on, leading to ulceration of the cornea, staphyloma and frequently necrosis and atrophy.

Like the rest of the body, the conjunctiva is infiltrated with the typical leprous nodule called by many authors lepromata. This manifestation of leprosy aids in irritating the conjunctiva, setting up a conjunctivitis, lacrimation and photophobia, and at times, pain. Because of the unusual condition, pterygia are found quite frequently, and may be on any conceivable portion of the sclera. The site of predilection of the leproma is the sclero-corneal region. It is at first slightly translucent, anemic, and pale grayish-yellow in color. It is often mistaken in its early stage for leucosarcoma, or a pseudovernal catarrhal condition. Grossmann,



Meller, Axenfeld, Roche, Sauvineau and Morax observed that the pericorneal area was most frequently invaded. Schirmer presented a case of this type in which he found the lepra bacillus in abundance.

The most prominent lesions of the cornea are anesthesia, nodules and several forms of keratitis. The cornea is affected late in the disease, being invaded by the nodule. Many theories have been advanced as to the method of invasion. Karnitsky and Weinstein note that leproma of the cornea is never primary, but extends from nodules in the sclero-corneal margin or from the canal of Schlemm. In case they take their origin from the former structure, the nodules raise the surface of the cornea; but if the invasion comes by way of Schlemm's canal, deep infiltration appears in front of Descemet's membrane. In the case reported, the leproma occupied two-thirds of the cornea and the neighboring sclera. The tumor was very vascular and consisted of round, spindle-shaped epithelioid cells, covered with several layers of epithelium which grew into the depth of the tumor. The lepra bacilli were found in great numbers. According to Fernandez, leproma of the cornea is very rare, but leprous keratitis is very frequent.

Scrapings of the infiltrated cornea were made by Gabrielides, who found the acid-fast bacilli in abundance both in the cells and between them. In a case described by Sauvineau and Morax the histologic examination revealed extreme infiltration of the corneal layers. The membrane of Bowman had disappeared and that of Descemet was in shreds, but the epithelium was unaffected. Axenfeld believes that the keratitis of leprosy is much more common than one would gather from the clinical reports, since he found bacterial colonies in cases with clinically clear cornea, which is in accord with the findings of Jeanselme and Morax. Roche observed a case of leprous keratitis which was symmetric. The corneal infiltrate had the appearance of fat and extended from the limbus to the center of the cornea, gradually les-

sening until it ended in a vertical line. Meller reports a case of keratitis punctata leprosa from Fuch's clinic. Both corneas were the seat of innumerable sharply circumscribed, intensely white dots, which were situated just beneath the epithelium, and were distinguished from the spots of superficial punctate keratitis by their sharply defined margins and intensely white color. Anatomic examination of portions of tissue removed from the cornea showed the spots were filled with clumped lepra bacilli, mingled with round cells.

Leprous keratitis offers a certain analogy with the interstitial keratitis found in hereditary syphilis. The stigmata are different, however, and there is a different pathologic history. The keratitis of leprosy may be of interstitial type, superficial, or deep punctate. The syphilitic condition is accompanied by photophobia, lacrimation and conjunctival injection, whereas leprosy may show no particular signs of an active lesion. In the latter, the sclero-corneal region most often shows the first sign of opacity which follows the circumferential curve of the cornea; it becomes more and more accentuated as the disease progresses. It, however, leaves the central portion free for a long time, and the lesion is frequently symmetric, although it is generally in different stages in each eye.

In syphilis the opacity usually starts in the center and extends in all directions; the borders of the lesions are diffuse and the cornea is steamy, resembling ground glass. Often a marginal infiltration is found, but there are transparent portions in places, whereas in leprosy there is usually none. The syphilitic variety shows signs of improvement under specific treatment, whereas the leprous keratitis progressively goes on to ulceration and atrophy. Otchapovski has seen several cases where the cornea has ulcerated thru.

Anesthesia of the cornea is not found in all cases, but when it is, the area can be touched without eliciting an oculo-palpebral reflex. Lopez has more than once seen flies sucking the material which exuded from the ocular tissue,

without the patient showing by the slightest wink that there was any sensibility in this region.

Most authors include the iris in the anterior segment of the eye. The most important lesions found here are nodules and iritis. The nodule may develop on any part of the iris, but probably the most favorable place is at the iris angle, or at the *circulus iridis major*. The iris has been the seat of leprosy manifestations in half the cases studied by Espada. Besides a serous iritis he has observed a special form in which the color of the iris was not affected, and in which numerous grayish points about the size of a pinhead were to be observed on its surface, these points being especially abundant in the neighborhood of the sphincter. In one case this miliary eruption was not accompanied by any marked reaction. In another the pupillary margin was bound down by posterior synechiae. In the first case all signs of iritis were plastic with the formation of a more or less thick pupillary exudate and more or less serious affection of sight.

The ciliary body is often involved, but it is rare to have on this account any acute symptoms, the only sign of cyclitis being deposits of exudate on the posterior corneal surface. Lesions of the crystalline lens are rare. When any occur, they are due to the invasion of the ciliary body. The lens matter loses its transparency, mainly thru nutrition changes.

In eighty-one cases of leprosy examined with the ophthalmoscope Trantas found changes in the eye grounds in 68 per cent. In 26 cases the anterior part of the retina, rendered visible by pressure with the finger on the ciliary region, showed small white dots, sometimes coalescing into large spots. Farther back in the fundus were spots marked by an extensive pigmentation. The retinal lesions on histologic examination were found to consist of thickening of the inner layer of the retina with slight cell infiltration and proliferation of the granular layers. Most observers agree with Lopez that in the advanced stage of ocular lesions the retina and choroid are also involved, but

early cases examined with the ophthalmoscope showed no lesions in the fundus.

Many attempts have been made to check the ravages of leprosy in ocular lesions. Grossman has suggested scarifying the lesion by incision. Trantas has energetically cauterized superficial lesions as they appear, and thus protected the eye from deeper invasion. To avoid mechanical action of the dust and irritating substances of the air, the eye should be treated as for a neuromyolytic condition. Cataracts have been successfully removed from leprosy individuals. Atropin should be used in ulceration of the cornea and iritis. Bland ointments relieve irritation. As yet there has been no specific treatment found to remedy the ocular conditions, as eye lesions are only a local manifestation of leprosy and can be affected only when the disease as a whole is successfully treated.

#### CASE REPORTS.

Case No. 1.—G. C. An Italian laborer, born in the County of Vanevendo, Italy, twenty-one years ago. Came to this country four years ago. Entered clinic because of difficulty in breathing thru his nose. Present condition started two years ago when he was troubled with a feeling of dryness in his nose. On forced cleaning scab-like masses were expelled. Troubled now and then with slight epistaxis which was checked spontaneously. Subject to cold sweats; does not cough, however, nor run an afternoon temperature. Patient does not complain of pulmonary, digestive, cardiac nor urogenital symptoms. Wears glasses; sight good, however. Upper extremities occasionally "fall asleep" and give a tingling sensation.

Has had none of the children's diseases. Gives no history of exposure to leprosy nor tuberculosis. Has always enjoyed the best of health. Denies lues or gonorrhea. Father died of some unknown malady at the age of 65 years. Brothers and sisters in America show no leprosy lesions. Mother and sisters in Italy in good health. Habits negative.

Patient apparently in good condition,



suffering from no particular pain. Has luxuriant growth of hair but beard is very slight. No facial nor ocular paralysis.

*Eyes.*—Lids are thickened. Has one or two nodules on orbicular prominences. Shows areas of anesthesia but no paralysis. Eyelashes normal. Presents slight conjunctivitis of both eyes. The ocular and palpebral conjunctivae are anesthetic and show congestion. There are no nodules nor pterygia present. But at the sclero-corneal margin, on the temporal side, is a nodule about 1 mm. x 2 mm. It is markedly elevated but not vascular; has, however, a fair blood supply arising from two conjunctival vessels from the outer canthus. The process is grayish-yellow in color, and continuous with a band of infiltration which surrounds a good portion of the sclero-corneal circumference for about one millimeter wide. The edge is diffuse and the whole resembles ground glass. The lesion is symmetric but the process on the left side not as marked. The oculo-palpebral reflex is not elicited when the nodule is pricked with a pin. The cornea, other than the periphery, is clear, but has a sluggish sensation reaction. There is nothing abnormal about the iris. The pupil reacts to light and accommodation. The examination of the fundus is negative.

The nose externally is negative. Internal examination shows the nares plugged with atrophic scabs, from which smears were made and the acid-fast bacillus of Hansen found. On clearing off the scabs, there is a perforation of the nasal septum 5x3 mm. in height, which does not seem to include the bony structure. The inferior and middle turbinals show atrophic changes. Transillumination of the sinuses is negative.

The rest of the examination is negative, except for the skin and the neurologic findings.

There are numerous small brownish-red patches on the face, the arms, buttocks, lower part of thighs and legs, which have no special form nor size, varying from a pin-point to 4 and 5 cm. The trunk shows none of these colored

pigmented areas, except an area of vitiligo on the back in the region of the 4th, 5th, 6th and 7th vertebrae. Accompanying these pigmented areas are nodules, most of which are anesthetic, and which vary in size from a small pea to a peach-stone. They are more noticeable on bony prominences such as the orbicular prominence, the elbow and wrist. There is also a general glandular enlargement in the cervical, axillary and inguinal regions.

On deep palpation the ulnar nerves are found to be thickened and nodular, more markedly so on the left side. The same thickening is found in the anterior peroneal and popliteal nerves. The areas of anesthesia are seen on the accompanying chart.

Laboratory findings: Urine examination negative; Wassermann taken before entering hospital negative. A later Wassermann at the hospital was shown to be positive, 2+. Blood examination: R. B. C. 5,636,000; W. B. C. 7,000; P. 76; L. M. 1; S. M. 23; E O; B O. Smear negative. Hemoglobin 95.

Case No. 2.—M. T. (Case referred by Dr. John E. Lane.) A Greek laborer, born in Argalaste, Greece, thirty-one years ago. Came to this country in July, 1912. Entered clinic because of "red spots on his body." A few spots first appeared on the face, which in the beginning were small and red, later becoming brownish and larger. The feet were next affected; following these the arms and hands. Lesions are not painful, have never itched, never broken down to form ulcers. Patient claims he feels well and the lesions do not trouble him in the least. For less than a year the left side of the nose has been almost completely blocked. Has had no previous catarrhal condition. Eyesight good; wears no glasses.

Measles as a child. Always well; never in bed for any illness. Denies lues and gonorrhea. Father living and well. Mother, one sister and two brothers living and well. No history of similar trouble in family or amongst relatives. No history of tuberculosis in family. Habits negative.

Patient well developed and nour-



ished. Has good color. Shows no facial nor ocular paralysis.

*Eyes.*—Lids are slightly thickened. Has two nodules on orbicular prominences. Shows no areas of anesthesia

Corneas clear. Pupils react to light and accommodation. Iris normal. Fundus examination shows nothing abnormal.

Internal examination of the nose shows a deflected septum which is

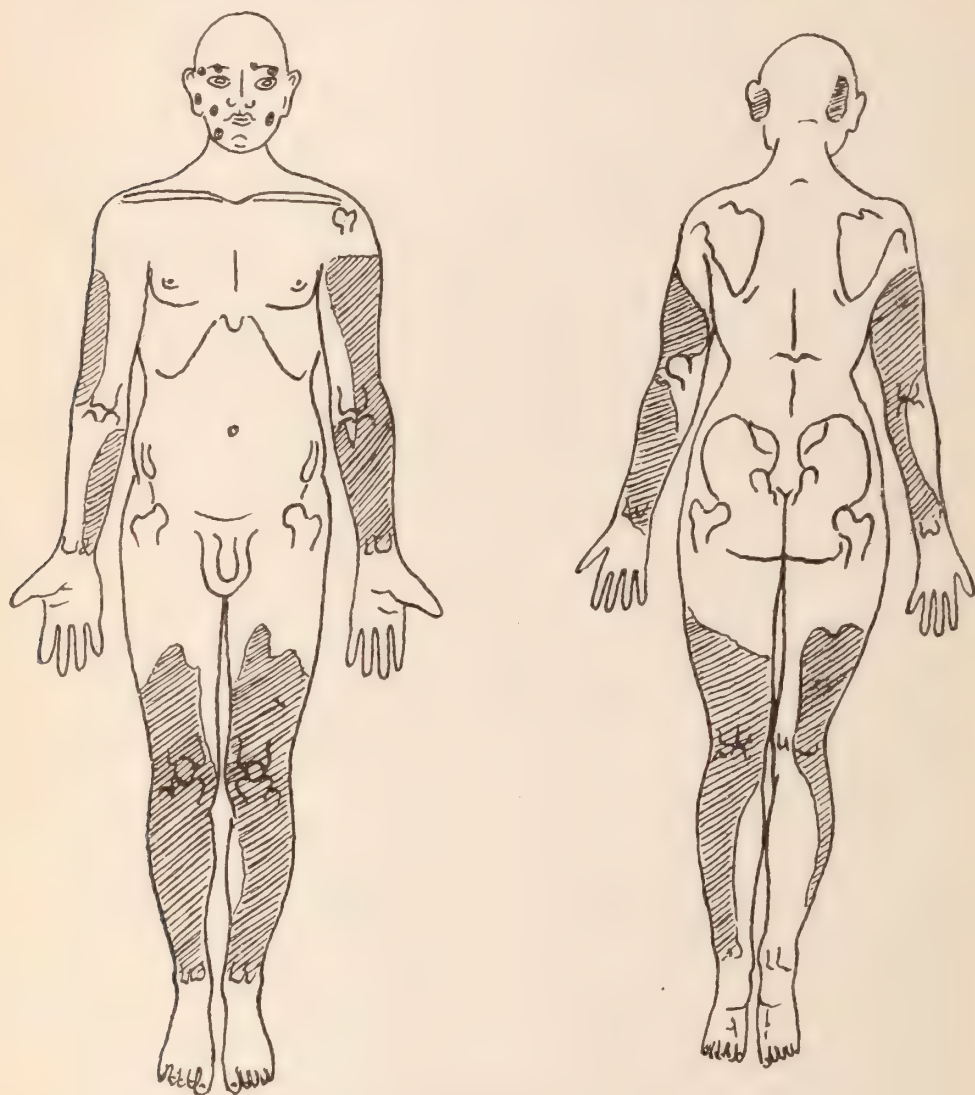


FIG. 1.  
Areas of anesthesia in Case I. (Yudkin).

except for a small plaque on the upper left lid, which also shows madarosis. The ocular and palpebral conjunctiva are somewhat congested. The sclera is clear in both eyes. The sclero-corneal junction shows nothing abnormal.

markedly thickened on the left side and with the middle turbinal occludes the upper nasal passage. The septum shows deeply excavated ulceration with ragged edges, pale in color, which bleeds very easily. Here and there

may be seen small whitish nodules on a pale mucous membrane. The inferior turbinates show an atrophic condition.

The face and forehead show numerous flat papules 2-4 mm. in size, which are light brown in color. On the right cheek there is a large infiltrated area 1 cm. in diameter, and two similar areas on the left cheek. There are also areas of brownish pigmentation of irregular outline present. On the left side of the forehead is a large projecting nodule 1.5 cm., occupying the skin and subcutaneous tissue, with considerable pigmentation around it. On the forearm and elbows, especially the extensor surface, are numerous flat papules of dull red color and rather soft consistency. There are also numerous areas without pigmentation. The trunk is almost free from eruption. The buttocks, front of thighs and lower legs, both in front and behind, show similar lesions, those on the lower legs somewhat larger and of a reddish color. The soles show several papules, the palms no lesions. On the left shin in front is an irregular thickened area 5 cm. in diameter with brownish pigmentation and scale formation.

Both ulnar nerves are greatly thickened throughout their course, somewhat irregularly, and at the elbow are about three times the normal size. The external peroneal nerves are similarly affected, also the popliteal nerves. The large lesion on the left shin is totally anesthetic. Many of the larger papules are also anesthetic. On the pigmented areas there is normal or slightly impaired sensation. Sensation, apart from the skin lesions, appears normal with rough tests.

Laboratory examinations: Urine examination, negative; Wassermann reaction + + + +; Blood examination: W. B. C. 11,000; P. 75; L. M. 5; S. M. 20; E O; B O. Smear shows achromia.

#### RESUMÉ.

The eye is invaded by the lepra bacillus of Hansen. It is usually secondary to a focus in some other part of the body. The majority of investigators agree that the anterior segment is the most frequently invaded. The lids may show marked thickening, nodules, areas of anesthesia, lagophthalmus, ectropion and madarosis. Epiphora is often due to the plugging by the chronic inflammatory process going on in the puncta and ducts of the lacrimal apparatus. In leprosy one often meets with conjunctivitis, which is due to two causes, one traumatic and the other symptomatic. When the conjunctiva is anesthetic and lagophthalmus and ectropion are present, the eye is predisposed to contract catarrhal conjunctivitis with a mucous or muco-purulent discharge. The chronic form is due exclusively to contact with external agents. The corneal changes are frequent and varied. A nodule of the sclero-corneal margin is usually accompanied by a belt of leprosy infiltration of the cornea. The keratitis is of two varieties, one the interstitial and the other the superficial or deep punctate variety. Sometimes a leproma may invade the center of the cornea. This is followed by a thinning of the membrane, which, when the intraocular pressure increases, may give rise to a staphyloma; or, if secondary infection invades the territory, there is ulceration, perforation and atrophy. The iris is affected in two ways (1) by the nodule in the region of greatest vascularity and (2) by iritis. The choroid and retina are less liable to be attacked in leprosy than other parts of the eye. When loss of vision is present, it is due to the invasion of the anterior rather than the posterior segment.

The author desires to express his thanks to Dr. James A. Honeij, under whose kindly supervision the paper was written.

#### BIBLIOGRAPHY.

- Arboleda. Neuritis optica leprosa. *An. de oftal., Mexico* 1913-14, XVI, 396.  
 Arboleda and Manrique. Ocular lesions of leprosy in Columbia. *An. de oftal., XV*, 361.  
 Axenfeld, T. Leprous keratitis punctata and hematogenous, metastases in nonvascular cornea. *Klin. M. f. Augenh., LIV*, 517.

- Borthen, L. Die Lepra des Auges. Klinische Studien mit pathologisch-anatomischen Untersuchungen von Dr. H. P. Lie. Leipzig, 1899.
- Breda, A. La Lepra del globo oculari e dei suoi annessi. *Gior. ital. d. mal. ven.*, Milano XVIII, 214.
- Bull and Hansen. The leprous diseases of the eye. Christiania. A. Cammermayer, 1873.
- Calderaro. Ricerche cliniche, anatomiche e sperimentale sulla lepra nodosa del globo oculari ed annessi. *Clin. ocul.*, Palermo, 1909, X, 3437-3490.
- Calendoli, S. Transmission of leprosy by inoculation into anterior chamber of rabbit. *Ann. di Ott.* v. 42, p. 581. (Abst. Y. B. 1913, p. 364.)
- Chance, B. Ocular aspect of leprosy. *Ann. of Ophthalm.*, v. XXV, 432.
- Chiari and Fortunati. Un caso di lebbra mutilanti con lesioni oculari. *Ann. di Ottal.*, 1894, XXIII, 95-104.
- Collins, E. T. Nodular leprosy affecting the eyes. *Tr. Ophth. Soc. United Kingdom*, XXIX, 223.
- Danielssen and Boeck. *Traite de la spedalskhed ou elephantiasis des grecs*. Traduit par L. A. Cosson. Paris, J. B. Bailliere, 1848.
- De Silva, W. H. Lepra ophthalmica in Ceylon. *Ophthalmoscope*, 1908, VI, 70-76.
- Doutrelepon and Wolters. Beiträge zur visceralen Lepra. *Arch. f. Dermat. u. Syph.*, 1896, XXXIV, 55-86.
- Espada, J. Ocular manifestations of leprosy. Third Pan-American Medical Congress, Havana, Feb. 4-7, 1901.
- Fernandez. Ocular Leprosy. *Ophthalmol.*, Seattle, 1912, VIII, 143-146. Complicaciones oculares de la lepra. *Cron. med. quir. de la Habana* 1911, XXXVII, 397.
- Franke and Delbanco. Weitere Beiträge zur Kenntnis der Anatomie der Augenlepra. *Arch. f. Ophth.*, 1904, LIX, 496-501.
- Gabrielides. Blepharite, keratite, iritis et retinite dans la lepre. *Arch. d'opht.*, 1914, XXXIV, 439-444.
- Grossmann, K. A clinical study of lepra ophthalmica with a description of cases examined at the Leper Hospital in Laugarnes, Iceland, in 1901 and 1904. *Brit. M. J.*, 1906, I, 11-18.
- Hart. Ocular lesions of leprosy. *Woch. f. Therapie u. Hyg. d. Auges*, v. 18, p. 19.
- Heymans, A. Surgical treatment of some eye affections in lepers. *South African M. Rec.*, Cape Town, XI, 246.
- Hollman, H. T. Diseases of the eye among persons affected with leprosy. *New York Med. Jour.*, v. 86, p. 776.
- Honeij, J. A. Leprosy: The presence of acid fast bacilli in the circulating blood and excretions. *Jour. of Inf. Dis.*, v. 17, 376.
- Jeanselme and Morax. Des manifestations oculaires de la Lepre. *Ann. d'Ocul.*, 1898, CXX, 321-366.
- Karnitzky and Weinstein. Ein Fall von Leprom der Hornhaut. *Klin. Monatsbl. f. Augenheilk.*, 1909, XLVII, 253-267.
- Lane, J. E. A case of leprosy in Connecticut. *New York Med. Jour.*, CIV, 1244.
- Lopez, E. Ocular leprosy. *Arch. of Ophth.*, XVIII, p. 404.
- Meller, J. Punctate keratitis of Leprosy. *Klin. Monatsbl. f. Augenh.*, Jan. '06. (Abstract Y. B. 1906.)
- Morrisey. Sporadic leprosy in Connecticut. *New York Med. Jour.*, CV, 940.
- Morrow and Lee. Ocular Symptoms of Leprosy. *Jour. A. M. A.*, LXV, 931.
- Neisser. Histologische und bakteriologische Lepra-Untersuchungen. *Arch. f. path. Anat. u. Physiol. u. f. klin. Med.* (Virchow's Arch.) 1886, CIII, 355-387.
- Otchapovski. Ocular lesions of leprosy. *Westnik oftalmol.*, 1900, XXV, 411-433.
- Raizis, Georges S. Lesions oculaires de la lepre. Paris thesis, 1906, No. 70.
- Roche, C. Un cas de keratite lepreus. *Rec. d'opht.*, 1909, 3 s., XXXI, 115-118.
- Sauvignau and Morax. Leprous keratitis with anatomical examination. *Ann. d'Ocul.*, 1909, CXLII, 156.
- Schirmer. Report of case of leprosy. *Arch. of Ophth.*, XLI, 299.
- Shikano. Leprosy of the eye. *Ophthalmology*, XII, 428.
- Stanziale, R. Experimental leprous lesions of rabbit eye. *Gior. ital. d. mal. ven.*, Milano, XLVI, 116.
- Trantas. Lesions ophtalmoscopiques chez les lepreux. *Bull. et mem. soc. franc. d'ophtal.*, 1899, XVII, 275-287.



# A CASE OF TRAUMATIC PULSATING EXOPHTHALMOS.

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This patient was seen before the beginning of proptosis, and watched during the development of the symptoms, the ligation of the carotid and the subsequent recovery of ocular position and movement, but with optic atrophy.

The following case history is recorded because it was possible for me to observe the ocular symptoms from the beginning, to note the progress of the disease, see the changes in the fundus when the carotid artery was tied, follow the patient through brain edema and to report the end result, a retained, freely movable eyeball.

Mrs. M. H., married, aged 66, was first seen by her physician, Dr. J. P. O'Brien, September 8, 1914. Family history negative, personal history negative, having always been healthy, well nourished, active and cheerful.

For three weeks, she has been complaining of a severe toothache like pain over the right parietal region, extending from the occipital area behind to the frontal and nasal regions in front, at times this pain is paroxysmal and accompanied by nausea and vomiting. While down in the cellar about one month before the pain was first noticed, she quickly straightened up from a stooping position and struck her head in the right parietal region against a beam. The injury caused severe pain and dizziness for a few days.

Bowels regular, once or twice a day. Urine negative. Temperature 98.2. Lungs negative. Heart: first sound normal, second sound accentuated with ill defined systolic whiff; area of dullness normal, systolic pressure 155, diastolic 108, pulse 70 compressible, small, regular. Abdomen negative. Patellar reflex very slight, some disturbance of sensation below the knees with areas of anesthesia.

Two days later, September 10th, patient felt very weak with increased pain, so marked that she could not bear the pressure of her hands on her head, nausea, vomiting and very marked diz-

ziness. Pulse 50, large and soft. Treatment consisted of elimination by the bowels. Analgesics had no effect on the pain for five days.

On September 22nd, I first saw her. Right eye vision 20/15? and with +4.00 Type 1. Pupil 3.5 mm. regular, active to light and accommodation. No conjunctival or bulbar congestion. Disk clearly outlined, no fundus lesion.

Left eye vision 20/20? and with +4.00 Type 1. Pupil 3.5 mm. regular, active. The same as the right in detail.

Refraction: R. +1.00 = 20/15; L. +1.25 = 20/15; 6 degrees of hyperphoria.

On September 26th, was ordered

R + 1.00  $\odot$  1 degree prism base up  
20/15 + 3.00 Type 1.

L. + 1.25  $\odot$  1 degree prism base down  
20/15 + 3.00 Type 1.

All annoyance disappeared by wearing the glasses.

On November 20th, she complained of double vision which had been present for from seven to ten days, a red spot to the outer side of the right eye and a sense of orbital tightness.

Right eye vision 20/40, although the same correcting lens gave 20/15. Limited external motion of the globe, eye turned in 15 degrees with paresis of the external rectus. The bulbar conjunctiva injected, with superficial vessels standing out as an encircling zone about the cornea and extending over the entire globe into the cul-de-sac. The lower part of the orbit was full, the upper, however, was normal. By the Hertel exophthalmometer, the eye was found proptosed 15 mm. the left 10.5 mm. Pupil 3.5 mm. regular, active to light and accommodation. Media clear. Disc and retina show large veins and arteries, with faint congestion. No in-

distinctness of nerve outline. Definite pulsation of the eyeball with distinct bruit over the globe extending to the right temporal region. The patient was told of the condition and advised operation. While waiting, she was kept in bed and given potassium iodide.

On December 3rd, 1914, the eye was much worse. Exophthalmometer, protrusion 22 mm. Marked chemosis of the lower half of the eyeball with intense congestion of the entire conjunctiva. Complete right sixth nerve paralysis, as well as partial third nerve involvement. Pupil 4 mm. regular, reacting slowly, disk edges blurry, vessel changes more marked, veins and arteries fuller, retinal congestion definite.

Under ether, Dr. A. W. Elting exposed the common, external and internal carotids, on the right side. The right eye was kept under constant observation with an electric ophthalmoscope; first to notice the effect when the common carotid was compressed, and second the result when the internal carotid was occluded. As both stopped pulsation of globe and fundus vessels, the internal carotid was ligated in two places with silk. The immediate result was the blanching of the fundus and a 5 mm. reduction in the proptosis, being with the exophthalmometer 17 mm.

The next day, December 4th, 1914, exophthalmometer 21 mm. with marked globe pulsation, edema of lids and conjunctiva and nerve head.

Three days after the operation, pupil was 5 mm. immobile. Patient was semicomatose with partial leftsided hemiplegia which, however, cleared later in the day. At this time, the patient was in a very critical condition, presenting evidence of considerable brain edema. On the tenth day following operation, the proptosis reached its greatest intensity, 23 mm., the disk edges were blurry but not edematous, and the globe pulsation marked. From the minute of operation, the eyelids

were strapped for protection of the cornea, the exophthalmos being so great that a keratitis was imminent especially as there was complete loss of globe motion and corneal sensation.

On the seventeenth day, the patient left the hospital. Exophthalmometer 22 mm., pupil 7 mm.

Twenty-six days after the operation, all pulsation of the globe disappeared and with it the bruit. Neither bruit nor pulsation has been present since. On the thirtieth day, motion began to return in the vertical direction. By exophthalmometer 19 mm. of proptosis. On the forty-fourth day, the globe protruded 17 mm. with free motion except outward, the sixth nerve remaining paralyzed. Pupil 6.5 mm., disk clearly outlined with beginning atrophy. On the fifty-first day, the eye was freely movable in all directions, bulging 15 mm. Complete optic atrophy.

Ninety-sixth day after operation the right pupil was 7 mm. immobile. In the macular region there is an irregular area of absorbed pigment, thruout the fundus a very marked narrowing of all the blood vessels. Proptosis 12 mm.

The left eye has remained as first noticed.

Some may wonder why the eyelids were not stitched together to protect the cornea. But had that procedure been followed, it would not have been possible to record the exophthalmos progress or retrogression, or to have detailed the fundus findings.

This case presents many points of interest, chief among which is the early diagnosis, for as far as I am able to find, no other reporter speaks of so prompt a recognition of the first eye symptoms; the excellent operative recovery following the very alarming circulatory symptoms on the third day after the operation. The complete recovery of eyeball motion and the preservation of the cornea are other noteworthy details.

# STAR SHAPED FIGURE IN THE MACULA OF SYPHILITIC ORIGIN.

HENRY C. HADEN, M. D., F. A. C. S.

GALVESTON, TEXAS.

The report of a case observed clinically to complete recovery, with illustrations.

The ophthalmoscopic picture known as the star shaped figure in the macula is so frequently associated with the degenerative changes in the retina accompanying Bright's disease, that its presence is almost pathognomonic. Similar changes are said to occur with

sun or star with all its rays complete, should occur in an otherwise healthy person, and under the influence of treatment disappear leaving an apparently normal macula is unusual.

The following is a report of the case: Miss R., aged 25 years, consulted

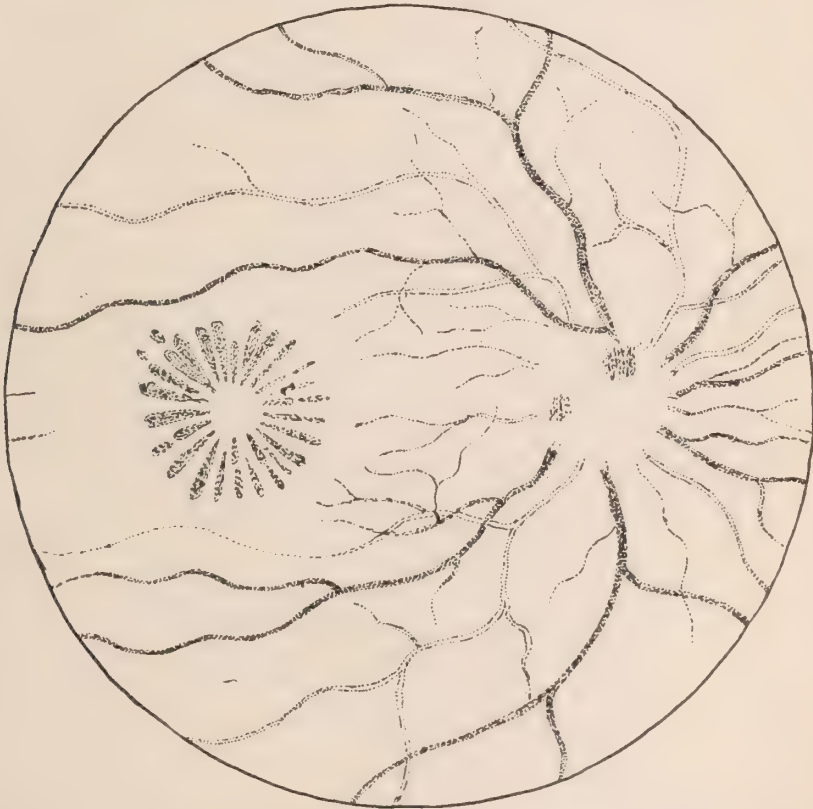


FIG. 1.  
Star Shaped Figure in Macula of Right Eye. Optic  
Disc Hidden by Exudate. (Haden).

choked disk or neuro-retinitis the result of cerebral and cerebellar tumors, and some few instances of more or less atypical appearance have been reported of uncertain origin.

That the same macular appearance, only slightly idealized into a perfect

me at my office Feb. 3, 1912. She stated that for the previous week she had had difficulty in seeing with the right eye, but that otherwise she felt perfectly well. She did not have headache or pain in any part of her body and was attending to her duties as school



teacher. Her general appearance was that of sturdy, stolid German, of the peasant class. Her parents were German farmers located in Texas. She was born in this country. Her family history was negative and her personal history presented nothing unusual.

Examination of the eyes:

O. D. V. = 2/60.

O. S. -1.00 S = 6/6.

somewhat circular arrangement. They were very white and had but little light reflex. O. S. The media and fundus presented no abnormal changes. The examination of the urine was ordered and made the following day. No albumin, sugar or casts were found.

When she returned two days later (Feb. 5, 1912) the vision of the right eye was 1/60. The ophthalmoscopic

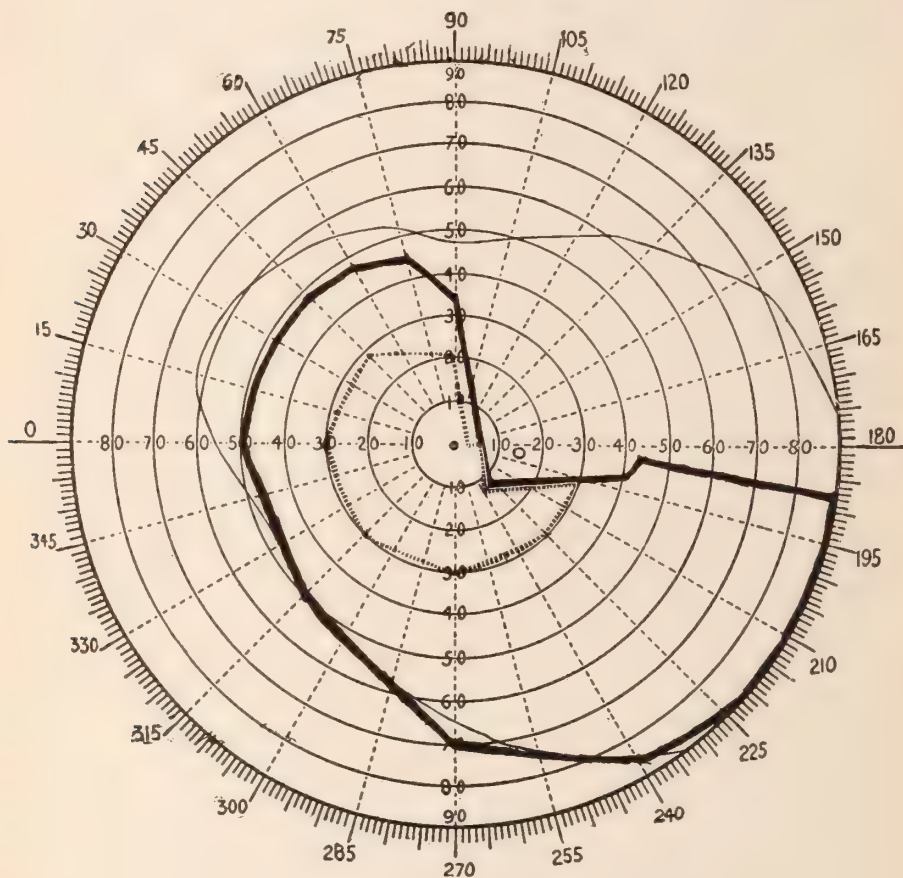


FIG. 2.

Field of vision at early stage of the disease. Loss of upper, temporal field. Solid line boundary of field for form. Dotted line boundary of field for red.

The ophthalmoscope revealed a slightly swollen disk which was fluffy and white in its nasal half. The veins near the disk were a little tortuous but not perceptibly enlarged and the arteries were unchanged. In the periphery of the macular region there were numerous oblong white spots in a

appearances had materially changed. The macular area was now occupied by a complete star, or more correctly described, sun shaped figure of startling brilliancy. It gave one the impression of looking into the depths of a white flower. The rays with few exceptions were equal, being approxi-

mately  $\frac{3}{4}$  disk's diameter long. They commenced around a circular area of dull red color  $\frac{1}{4}$  of a ray's length in diameter, whose depressed center was the fovea centralis. On the disk, in its upper and lower part, two splotched hemorrhages had appeared.

The visual field of the right eye showed loss of the superior temporal

fear of exciting suspicions in her family. Inunctions of mercurial ointment, one-half drachm daily, and potassium iodid, gr. 10 three times daily, and increased gr. 1 per dose, were prescribed.

Feb. 12, 1912, the macular figure had faded a great deal, especially down and in, where in some parts it had entirely disappeared. The foveal cup was not

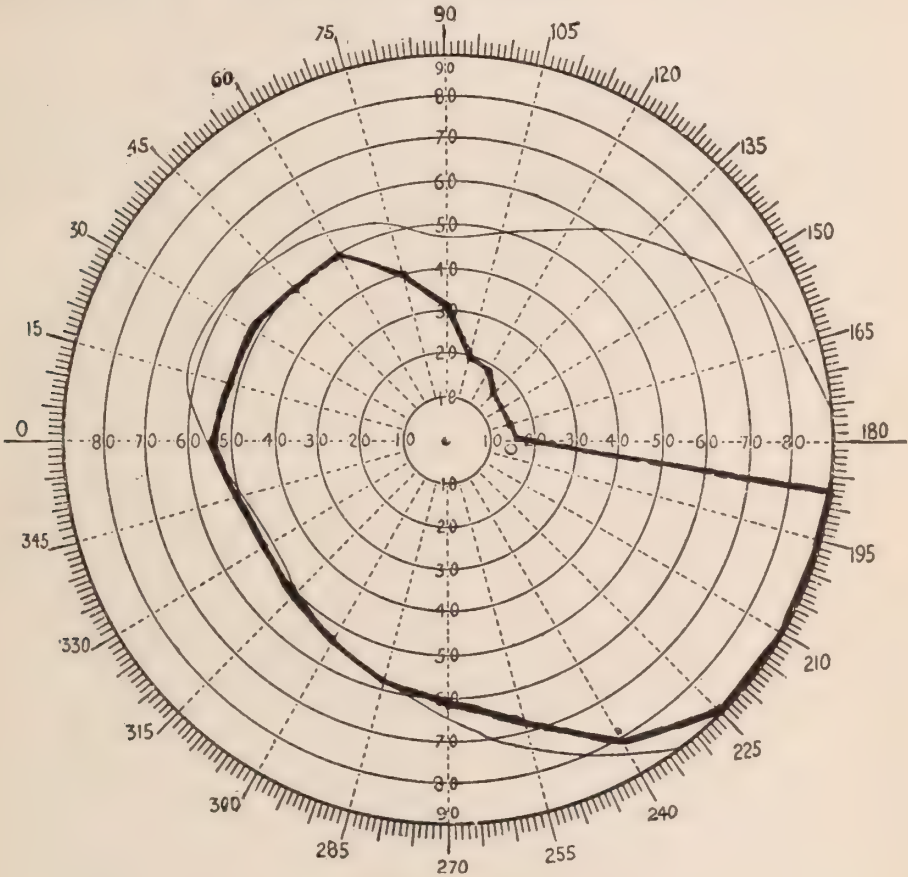


FIG. 3.

Field of vision after twenty-eight months, showing permanent defect of field for form.

quadrant, and some contraction in the superior nasal portion for form and colors. Fixation was not involved and there were no scotomata. The fields of the left eye were normal.

A thorough physical examination, including the nose, throat and ears was made but nothing abnormal was found. The reflexes and station were normal. A Wassermann test was not made for

so deep and the macular area was flatter. The disk was more obscured. It had become an ill-defined mass in which the vessels were only occasionally seen. It was slightly elevated and feathered off into the surrounding fundus. The vision was  $\frac{1}{60}$ . The inunctions were increased to one drachm daily, and the iodid increased.

Feb. 26, 1912, the macular figure was

absent on the nasal side, but still well defined on the temporal side. The vision had increased and was 5/60.

March 22, 1912, the macular figure had disappeared, except four or five spots on the temporal side. The temporal margin of the disc was well defined but the nasal side, especially the lower quadrant, was swollen, white and feathery. At this date she was taking potassium iodid gr. 100 three times daily. The mercurial inunctions had been discontinued for one week. The vision of the right eye with  $-1.25$  Sph. was 6/20. The K. I. was continued.

When seen June 1, 1912, the macula was free of spots. The disk was atrophic on the nasal side, being especially white in the lower nasal quadrant. The lamina cribosa were not seen. The fields were practically the same as when first measured.

The vision of the right eye with  $-0.75$  Sph. was 6/6, and 0.50 meter type was read at 18 cm. The urine had been examined frequently, but at no time were albumin, sugar or casts present. The specific gravity ranged from 1015 to 1030.

June 11, 1914, two years later, the vision was normal and the ophthalmoscopic appearances and fields were the same as when last recorded in June 1, 1912.

I believe that the lesion that produced the macular figure was an exudate in and swelling of Henle's outer fibre layer of the retina, secondary to a local inflammation in the optic nerve near to and involving the papilla. The cause of these lesions may only be surmised but in view of her tolerance to mercury and iodid, and the rapid improvement during their use there is a strong probability that it was syphilis.

## A PATHOGENIC BACILLUS SUBTILIS ISOLATED FROM THE EYE.

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MONTREAL, CANADA.

A bacteriologic study based upon two cases of panophthalmitis following cataract operation, made in the Department of Bacteriology of McGill University and the Royal Victoria Hospital, Montreal. Read before the Canadian Medical Association, June 15th, 1917.

The bacillus subtilis was found several times by Silberschmidt as the causative agent of panophthalmitis in man. He was able, by inoculation of rabbits, to reproduce the disease. Kayser<sup>1</sup> also described two cases of panophthalmitis in which bacillus subtilis was demonstrated as the causative organism. A purulent conjunctivitis has been described by Michalski<sup>2</sup> as the result of infection by an organism closely related to the hay-bacillus, but differing from it by the acidification of milk, the production of a brown pellicle on broth and of brown colonies on agar as with *B. Mesentericus Vulgatus*. The author designated this organism as *bacillus conjunctivitis subtiliformis*. Very closely related to bacillus

*subtilis* is the *B. Peptonificans*,<sup>3</sup> the cause of epidemics of gastro-enteritis. The colonies on gelatine present a crown of fine rays.

The present communication deals with the investigation of two cases of panophthalmitis, in which an organism identified as bacillus subtilis was isolated, its source traced and its pathogenicity demonstrated. The infections followed operations for cataract. The bacteriology of the conjunctival sac was determined, and in each case there was found a staphylococcus albus, non-hemolytic and non-proteolytic, and a diphtheroid bacillus with the fermentative reactions of bacillus xerosis. In each case twenty-four hours after operation there was set up a tremendous



suppurative condition of the whole eye, and of the upper and lower eyelids. After five or six days this condition began gradually to subside and terminated in cicatrization of the eye, leaving the eye as a grey nodule half of its former size (phthisis bulbi).

The pus was examined in direct smears and transfers were made to Loeffler's blood serum. The organisms recovered from the pus were in pure culture, and corresponded in morphology and cultural and biochemical reactions to *bacillus subtilis*.

In an attempt to trace the source of the infection a bacteriologic examination was made of the saline that had been used for irrigation in the operations previously referred to. Five cubic centimeters of this saline were transferred by a sterile pipet, and under sterile precautions, to broth extract. After twenty-four hours' incubation there was growth of an organism identical in morphology and cultural characteristics with that found in the patients' eyes.

A bacteriologic examination was made at the same time of the rubber tubing and glass funnel which had formed the irrigation apparatus. Normal saline, twice autoclaved and proved perfectly sterile, was passed through the funnel and through the rubber tubing and the washings were delivered into flasks of extract broth. After twenty-four hours' incubation, an organism was recovered identical with that from the patients' eyes and with that from the saline used for irrigation. The conclusion, therefore, was that the transmission of the infection took place from the saline that had been used to irrigate the eye.

The experiments for the determination of pathogenicity were performed on rabbits. A twenty-four hours' broth culture of the *bacillus subtilis* was employed. A few drops of the culture were introduced into the anterior chamber of the eye by the following method; the conjunctiva was incised at the limbus by a keratome, and aqueous allowed to escape. By means of a sterilized hypodermic syringe a few drops of the culture were then intro-

duced into the anterior chamber, without producing any increased tension. In twenty-four hours there followed tremendous suppuration of the eye, and edema of the eyelids. The animal was very sick. The condition began to subside in a few days, and in two weeks there was cicatrization with the formation of a hard nodule.

The other rabbits were injected with the same culture, the one subcutaneously, the other intravenously. No abscess was formed in the animal which had been injected subcutaneously; the other animal which had had as large an amount as 5 cc. of the culture introduced into the blood stream showed no ill effects, other than a short period of malaise; and the animal developed no eye lesion.

Other experiments were performed with the object of comparing the effects of other races of *bacillus subtilis*. One of these races, when introduced into the anterior chamber of the eye, produced no untoward effects beyond a slight opacity at the site of inoculation. This experiment was not considered parallel, however, because the age of this organism was not known. Another experiment was therefore performed, using a strain freshly isolated from hay-infusion by heating the infusion (prepared by steeping hay in sterile distilled water over night) at 80° C. for one hour and subsequently plating on plain agar. This organism also was incapable of producing any pathogenic effect when introduced into the anterior chamber of the eye. On the other hand, the original pathogenic *bacillus subtilis* was capable, after eight generations, of producing a panophthalmitis as severe as that produced by the organism when freshly isolated.

A twenty-four-hour broth culture of the pathogenic *bacillus subtilis* was subjected to filtration through a Berkefeld filter, and the resulting filtrate was introduced into the anterior chamber of the eye of a rabbit. No pathogenic effects were observed.

It would seem, then, that this pathogenic *bacillus subtilis* is elective for the eye. This pathogenic property is an

attribute only of certain races of the organism. Stregulina<sup>4</sup> thinks that those races of bacillus subtilis which come from the soil can be pathogenic. Of twenty-five samples that he inoculated into guinea pigs, sixteen were pathogenic and three of these produced panophthalmitis. On the other hand, such factors as repeated animal passage and cultivation on media containing blood, which have long been known to enhance pathogenicity may play a part in

some indirect way. Indeed a pathogenic bacillus subtilis has been obtained by Charrin and De Nittis<sup>5</sup> by repeated animal passage and cultivation on blood-media. But they found that at least three-quarters of their most pathogenic culture obtained in this way was required in order to kill a guinea pig.

I wish here to thank my chief, Dr. A. A. Bruere, for helpful suggestions.

#### BIBLIOGRAPHY.

1. Kayser, Centralblatt f. Bakteriologie. 1 Pt. vol. 33, page 241.
2. Michalski, Centralbl. f. Bakteriologie. Orig. vol. 36, p. 212.
3. Lubenau, Centralbl. f. Bakteriologie. Orig. vol. 40, p. 433.
4. Stregulina, Zeitschr. f. Hyg. u. Infektionskrankh. Bd. LI, 1905, p. 18.
5. Charrin and de Nittis. Compt. rendu de la soc. de Biol., 1897, p. 713.

## OPHTHALMIC EXAMINATION OF DRAFTED MEN AT CAMP JACKSON.

CAPTAIN BURTON CHANCE, M. D.

PHILADELPHIA, PA.

Ophthalmologist's report covering September to December, 1917. Read before the Section on Ophthalmology of the College of Physicians of Philadelphia, February 21st, 1918.

Up to the middle of December, 1917, the men, white and black, in the first selective draft of the new National Army received at the cantonment at Camp Jackson, Columbia, S. C., were drawn directly from the Carolinas and Florida, but in the later weeks of the period additional men hailing largely from Tennessee and Arkansas, entered by transfer from Camps Pike and Gordon.

As viewed by a stranger from the North, these men presented physical and social characteristics not commonly seen in the ordinary experiences of his practice in an eastern city. Except for the Floridians it might be said that all were descended from families which had been in America for many generations. The white Carolinians were, in the main, above the average

height, the majority having long heads, fair complexions; their skins being thin and of delicate texture and their irides blue or gray—characteristics betokening British ancestry, which ancestry was further indicated by their family and given names. The Tennesseans were not so tall, their facial lines smaller and their complexions swarthy. The Floridians were of mixed types; their names as well as their physical characteristics indicated descent from more recent European emigrant ancestry, while a number were natives of Cuba and of other of the Spanish West Indies.

The negroes were quite African, scarcely any were mulatto. They came from all sections of the states named. They appeared to be members of distinct groups as they could be distinguished by their facial and general physical linea-

ments, and were further separated by their variations in speech. They were of pure unmixed tribes, apparently, and one fancied that he could tell which were Zulu, which Kaffir, which Hottentot, and which from the Guinea Coast; and, to one conversant with these variations among them it was possible to tell from exactly which county of this state an individual came. A negro from Charleston or the sea coast was readily differentiated from the negroes of the highlands of North and South Carolina. There was a sprinkling of Cherokee and other Indian tribes, long resident in Florida and the Carolinas.

In this present consideration it must be borne in mind that the men sent to the camps by the draft boards were presumed to be in perfect health and quite fit to serve as soldiers; and, that the majority of them did not arrive until several weeks subsequent to their local board examinations. Immediately after arrival at Camp Jackson they were subjected to a rigid examination by the regimental surgeons, before they could be assigned to the various organizations apportioned to the cantonment. When the surgeons were in doubt as to their physical fitness they were referred to a Central Board of Examiners, composed of the chiefs assigned to the several departments of the base hospital, viz., surgery, medicine, including heart, blood vessels and lungs, psychoneurology, venereal disease, otolaryngology and ophthalmology.

It, doubtless, will be of interest to be told of the ophthalmologic affections which were deemed of sufficient gravity to disqualify for the service, according to the regulations prepared by the Surgeon General of the army, and prescribed by the President of the United States, to wit: "The minimum visual requirements to be as follows: 20/40 for the better eye, and 20/100 for the poorer eye, provided that no organic disease exists in either eye." And further: "The following defects are causes for rejection: Acuity of vision below the requirements of the preceding paragraph; conjunctival affections, including trachoma and entropion; strabismus, diseases of the lachrymal apparatus, exophthalmos, ptosis, asthenopia, nystagmus." These require-

ments have been greatly modified and will not hold in the future selection of draft men.

Here is a summary of the cases rejected by my board:

**DISEASES OF THE LIDS AND EYEBROWS:** Marginal blepharitis, 2; chalazion, 1; traumatic coloboma, 1; dermoid cyst of the orbital ridge, 1; dermatitis venenata, 1; distichiasis, 1; ectropion after abscess, 2; ptosis, 1; symblepharon, 1; sycosis tarsi, 1.

**LACRIMAL APPARATUS:** Dacryocystitis, catarrhal, 1; after fracture, 1; lacerated wound involving the sac, 1.

**CONJUNCTIVA:** Catarrh, acute, 2; chronic, 8; conjunctivitis, "granular," but not trachomatous, 3; distinctly trachomatous, 35; gonorrheal, 1; gunpowder pigmentation, 1; pterygium, unilateral, 2; bilateral, 9; recurrence after removal by previous operation, 1. The eyelids of every man examined were turned to expose the retrotarsal folds—the most efficient instrument for the purpose I found to be the corner of the desk blotter, which could be applied to the full length of the tarsus. Later I whittled a stick like a golf stick.

The cases of acute conjunctivitis rejected were marked by symptoms amounting to blennorrhea.

It was not possible for me to ascertain the number of cases of trachomatous disease rejected by the regimental examining surgeons, but the comparatively small number found by the Central Board quite surprised me, as a greater number had been anticipated. The cases seen by us exhibited only moderate signs, not at all so severe as we might have seen at any day's clinic in the northern cities. Few showed cicatrices, however, but all rejected presented roughening of the upper tarsus, with granulation of the free borders and retrotarsal folds. Only two negroes, who were very black and of short stature, had trachoma.

A comparatively large number of cases of specific urethritis arrived at the cantonment, yet only one case of gonorrheal conjunctivitis was referred to me, and he was a negro. The anterior segment of his globe was already destroyed, with the uvea bulging through the corneal perforations, on his arrival.



In my previous experience I had not seen pterygium in young subjects, yet at these Central Board meetings eleven men were disqualified because the wings extended so far over the corneas as to interfere with sight. One man had bilateral growths, one of which being a recurrence at the site of a mass which had been removed five years previously.

**CORNEA:** Nodular degeneration, 2; keratitis, dendritic, 1; herpetic, 2; interstitial, 1; ulceration, 1; vascular pannus, 1; keratoconus 1; leukoma, believed to be malarious, 1; maculation, 7; gunpowder pigmentation, 1. Staphyloma, 1; accompanying gonorrheal ophthalmia, 1; results of penetrating wounds, 3.

The cases of nodular degeneration of the cornea were bilateral. In one case the spots were at the centers; in the other they were in the outer zones, yet in each case the peripheries were clear.

It was interesting to have recorded only one case of interstitial keratitis and but a single case of pannus. The end-results of wounds of the cornea showed cicatrices through the limbus with more or less involvement of deeper tissues.

The case presumed to have been malarial keratitis occurred in a man who had had several attacks of malaria in an aggravated form, he stated, in each of which his eyes became inflamed. His last seizure had been within the twelve-month. The inflammation had lasted several weeks; since the subsidence he had noticed that his sight had become imperfect. There was a localized opacity in the parenchyma.

The case of staphyloma was at the upper limbus and had supervened after repeated attacks of inflammation of the anterior segment. It protruded prominently when the lid was raised.

**IRIS AND CILIARY BODY:** Foreign body in anterior chamber, see glaucoma; ciliary staphyloma, 1; coloboma, 2; corectopia, 1; exclusion of pupil by annular synechia, 1; iritis, recurrent, 1; ectropion, 1; paralysis of sphincter pupillae, 1; posterior synechia, 2; results of lacerated wound, 1. The coloboma of the iris included the sphincter and extended completely into the ciliary body.

**AFFECTIONS OF EYEBALL:** Exophthalmos, 2; glaucoma, secondary to wounds,

with the presence of foreign body in the anterior chamber, 1.

The etiology of the two cases of exophthalmos was not ascertainable; they were not goitrous. In consultations with my colleagues I examined a score of cases, perhaps, of Graves' disease with exophthalmos.

**MUSCLES AND NERVES:** Nystagmus, horizontal constant, 3; "intermittent," 2. Paralysis: External rectus, 1; inferior oblique, 1; superior rectus, 1; strabismus, convergent, 34; divergent, 11.

The "intermittent" nystagmus exhibited features the like of which I do not recall having seen hitherto. In each case the eyes were quite normal until after slightly prolonged efforts at convergence-fixation, when with almost startling rapidity the eyes oscillated from left to right in the chord between the vertical meridian and the extreme right. The movements continued for a few seconds and then after a moments' rest if further efforts at convergence were attempted a similar explosion would follow. I did not consider these to be cases of true nystagmus, but rather that they were due to inherent weakness. Neither man presented signs of generalized nervous disease.

**CRYSTALLINE LENS:** Cataract: Cortical, immature, 1, mature, 2; anterior polar, 3; disciformis, 1; post-traumatic, 5; opacity, 1; results of punctured wound, 1.

Of those showing disorder in the crystalline lens two were cases of mature monocular cataract, in appearance like senile cataract; in each case the fundus of the fellow eye appeared perfectly healthy. The disciform cataract was of the type such as that which I reported some years ago as having found in several members of a family, the opacity being situated behind the nucleus in advance of the posterior pole.

**CHOROID:** Albinism, 1; simple generalized atrophy, 6; traumatic atrophy, 1; in relation to myopia, 1; chorioretinitis, 1; associated with acne, 1; choroiditis disseminata, 1; coloboma, 1; rupture, 4. The coloboma occupied the lower median fifth, extending up to the edge of the disc. The ruptures were all of the

usual form in the temporal half of the fundus.

**RETINA AND OPTIC NERVE:** Retinal atrophy, 2; after injury, 1; optic atrophy, 19; said to be congenital, probably hereditary, 3; postneuritic, 2; papilledema, accompanying hemiplegia, 1; retinitis proliferans, 3.

**ANOMALIES OF REFRACTION AND ACCOMMODATIONS:** Amblyopia ex anopsia, 5; anisometropia, 1; hypermetropia, 19; myopia, 13; paralysis of accommodation by use of cycloplegics, 1.

Of the nineteen cases of hypermetropia and thirteen myopia rejected, several, who had claimed that they were blind, expressed delight when a manifest correction gave them useful sight.

**MALINGERING:** No statistical and analytical records were kept of those who feigned blindness. As already stated, the men had been drawn largely from the country and mountainous districts of the Carolinas and of Florida. There were, also, laborers from the towns of that state. Many received from Tennessee, Kentucky, Arkansas and Mississippi were from districts remote from the large cities. The blacks came chiefly from the Carolinas.

It was not always easy to ascertain the acuteness of the men's sight, for many could neither read nor write, and not a few did not understand the numeral characters. It should be remembered that the men of greater degrees of education had already enlisted in the National Guard. Many magnified their visual or ocular complaints, yet their efforts at malingering were manifested most crudely. With some it became evident that they had been coached, because I noticed that they would readily read to, say, 20/70, with the right eye, and 20/100 or 20/200, with the left, yet, while off their guard, when the order of examination was reversed, would read better with the claimed-to-be-poor eye and worse with the hitherto good eye. Others lost control of themselves by their interest in pointing the direction in which the arms of the "illiterate—E" were placed while others were detected by their ability to count the strokes of those of the 20/15 line; and others perceived short 1-inch lines which they counted at full

20/20. Quite a number deliberately closed their eyes, declaring they could not see; others feigned complete blindness, yet they admitted that they had for years followed gainful handicrafts and that they had found their way unaided from their barracks, to which they had been introduced in the middle of the night previous. Others, whose manifested standards were below requirements, evinced the greatest interest in the records while they were being made, and, several were detected reading the cards with the greatest ease.

Among the inflammatory states seen were several cases which I assumed to have been self-inflicted, as, for instance, by the placing of gritty substances beneath the eyelids. Such inflammations were always monocular and the physical signs localized. One individual had complete long continued mydriasis with cycloplegia artificially induced. No man tried to simulate blindness who had actual disease of his eyes or lids likely to destroy his sight.

Every man referred to me was given a dark room examination. A common complaint by those whose visual acuteness was under question was that the reflection from the ophthalmoscope was painful and blinded them. In the tests prisms, stereoscopes and colored glasses were used. My methods of procedure sought to analyze the history of each man's sight, and, in addition to the inspection of his eyes, a survey of the general health in needful cases was made.

My service on the board became a delightful experience, the members cooperated with ever-ready helpfulness, and, while every effort was made to accomplish the day's quota with dispatch, time was taken to study each man's case from every point of view for the proper rejection of ineligible men.

I here wish to pay tribute to my colleagues. All had been called from active practice and in the day's round they gave of their best. Our service on the "Central Board" fitted us for a still closer association in the wards of the base hospital when it was opened for the reception of the sick. Of my experiences in the hospital I trust to be allowed to speak at another time.

# WASSERMANN FINDINGS IN OPHTHALMIC DISEASE.

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Report regarding five hundred cases studied in the Pathologic Laboratory of Wills Eye Hospital, with remarks on methods employed and significance of results.

The following report is based upon the study of 500 Wassermann reactions of patients suffering from eye conditions, to determine whether syphilis was an etiologic factor and so aid in diagnosis and future treatment. These tests were made by the method of Wassermann. There were two antigens used: an alcoholic extract of syphilitic liver and a cholesterinized alcoholic extract of beef heart. In syphilis the reaction does not become positive, as a rule, until about the seventh or eighth week after the appearance of the initial lesion, or chancre, although a positive Wassermann has been reported in five days after the appearance of the initial lesion. (Laird.) This fact is interesting to ophthalmologists in cases of suspected chancre of the eyelid, and we have to rely upon the clinical symptoms until the appearance of the secondary lesions, or until by repeated tests a positive reaction is obtained. A quick diagnosis can often be made by expressing from the lesion some serum and examining under the microscope with the dark field illuminator, showing the *Spirocheta Pallida*, silvery white in a dark field.

In the secondary form, the diagnosis is made from the clinical findings, and a Wassermann is done only as a confirmatory measure. A negative in this case is considered as almost a certainty that the disease is absent. An example of the secondary form is that of syphilitic iritis in the form of nodules. This was formerly called gumma of the iris, but, as pointed out by Widder, is now considered as an iritis papulosa or condyloma. This is an inflammatory condition of the anterior segment of the eye. Chronic affections are more dis-

tinctive of disease of the posterior segment.

Syphilitic eye conditions may be congenital or acquired. In the tertiary forms of untreated syphilis, about 96 per cent are positive. Boas reports 435 cases in which treatment had been given, in which 80 per cent gave negative reactions. A positive reaction means syphilis, whether acquired or congenital. A negative reaction is not proof positive that syphilis does not exist, and future tests should be made if syphilis is suspected. A positive Wassermann may often be obtained from the test of the cerebro-spinal fluid, although the blood serum shows a negative result.

Citron originally observed that during mercurial treatment the Wassermann gradually becomes weaker and finally disappears. A negative reaction after treatment does not say that a cure is effected and the patient is free from spirochetes. Frequent Wassermann's should be made for a period of at least two years and occasionally during life.

In cases of latent syphilis, or cases strongly suspected of being syphilitic, where a negative reaction is obtained, antisyphilitic treatment in the form of mercury or salvarsan may be given. By the provocative stimulation of the spirochetes by drugs insufficient to kill them, one causes a positive reaction and thus shows a latent syphilis requiring further treatment.

The following cases were listed in the laboratory according to the diagnosis accompanying the specimen, and I am therefore unable to state the associated clinical conditions. No effort was made to classify the diseases.



	Number of cases.	Posi- tive.	Neg- ative.			
Amblyopia (toxic) .....	1	1	0	Orbital growth .....	2	1 1
Atrophy of optic nerve .....	74	30	44	Perivasculitis .....	2	0 2
Blepharospasm .....	1	0	1	Paralysis, third nerve .....	1	1 0
Buphthalmus .....	1	0	1	Paralysis, external rectus...	17	7 10
Brain tumor .....	3	0	3	Ptosis .....	20	5 15
Cataract (incipient) .....	2	0	2	Retina detached .....	2	2 0
Ciliary ectasia .....	1	1	0	Retinitis—		
Choroiditis .....	26	9	17	Chronic .....	7	0 7
Exudative .....	1	1	0	Circinata .....	1	0 1
Disseminata .....	5	2	3	Hyperplastica .....	1	0 1
Macular .....	2	0	2	Pigmentosa .....	1	0 1
Cycloplegia .....	2	2	0	Chorio .....	7	2 5
Corneal opacities .....	1	0	1	Retrobulbar neuritis .....	2	0 2
Conjunctivitis purulent .....	2	0	2	Scleritis .....	1	1 0
Convergent squint .....	1	1	0	Supraorbital abscess .....	1	0 1
Choked disk .....	7	1	6	Tarsitis .....	1	1 0
Cornea (leucoma) .....	1	0	1	Uveitis .....	27	11 16
Dacryocystitis .....	1	1	0	Vernal catarrh .....	1	0 1
Descemetitis .....	3	0	3	Vitreous opacities .....	15	4 11
Diplopia .....	5	1	4			
Enlarged lacrimal gland...	1	1	0		500	209 291
Episcleritis .....	1	0	1			
Irido-cyclitis .....	9	4	5			
Iritis, plastic .....	46	21	25			
Traumatic .....	2	0	2			
Rheumatic .....	2	0	2			
Papulosa .....	1	1	0			
Gummosa .....	3	3	0			
Kerato .....	10	4	6			
Iritis with secondary glaucoma	1	1	0			
Keratitis, sclerosing .....	3	2	1			
Hypopyon .....	1	0	1			
Ulcerative .....	7	3	4			
Interstitial .....	107	66	41			
Neuroparalytica .....	1	0	1			
Punctata .....	5	0	5			
Superficial punctata .....	2	0	2			
Serpiginous ulcer of cor- nea .....	1	1	0			
Glaucoma, secondary .....	3	0	3			
Glaucoma, inflammatory .....	1	0	1			
Gumma of orbit .....	1	0	1			
Leucoma adherens .....	1	1	0			
Leucoma with proptosis .....	1	1	0			
Mikulicz's disease .....	2	2	0			
Neuroretinitis .....	20	6	14			
Optic neuritis .....	14	7	7			
Ophthalmoplegia .....	3	0	3			

It is not my intention to pass judgment upon the question whether, in the cases giving plus reactions, the eye conditions are always necessarily due to syphilis, or that the cases giving negative reactions might not at times be due to syphilis, but rather to show the results obtained by the study of all the cases presented through a large eye service.

For example, the case of toxic amblyopia: This condition may have been caused by methyl-alcohol, tobacco, or other toxic substance, and therefore does not necessarily indicate that this case was due to syphilis, because of the fact that there was a plus 4 Wassermann.

The records of the Wills' Hospital, which are open for examination, contain the complete clinical and pathologic records of the foregoing cases.

# THE ASSOCIATION OF OCULAR AND NASAL ACCESSORY SINUS DISEASE.

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This is a general review of these associated lesions and diseases as described in the literature and encountered in practice. It was read in a symposium before the Section of Otology and Laryngology College of Physicians, Philadelphia. With bibliography.

It will be conceded readily that the careful study of the ocular symptomatology associated with or directly caused by disease of sinuses accessory to the nose, is the focal point to which converge two important specialties. To the ophthalmologist the early recognition of this association is always important, and his failure in it may be an exceedingly grave one. It has long been recognized that the etiology of the often complex symptomatology of this anatomic and clinical borderland may require for its elucidation the cooperation of the internist, the laboratory and X-ray experts, in association with the rhinologist and ophthalmic surgeon.

Some of the ophthalmologists present will recall the discussion precipitated some ten years ago by Dr. Posey in a paper before the American Ophthalmological Society upon the position of the ophthalmologist in the treatment of nasal sinus disease, the plea being made for a more accurate appreciation and study of the relationship obtaining between these ocular and nasal structures. In his discussion of Posey's paper, the late Dr. Gruening of distinguished, if somewhat bellicose memory, replied, "The ophthalmologists do pay attention to these conditions and the ophthalmologist must be a rhinologist that is understood and there can be no doubt about it."

The enormous development of each of our specialties during the last ten years may well make us question this dictum of Teutonic finality. It was Arthur Christopher Benson who said of the specialist that he was harmless and necessary, so long as he was aware of his limitations. The ophthalmolo-

gist who has the temerity to attempt an entrance into the field that you so preeminently command, if he has had sufficient training to make him conversant with these associated conditions, may intelligently examine and conservatively treat them; but must be prepared to ask the assistance, at the proper time, of his rhinologic confreres in the performance of the necessary operations upon the contiguous sinuses.

Let us try to disassociate our study from the stigma of undue magnification of the cause of the ocular symptomatology as necessarily resident in the sinuses, even though disease of both structures exists. In the development of this thought, it behooves us, likewise, to be constantly on guard to recognize the constitutional factors that may be inducing a toxemia of each of these contiguous structures at one and the same time, the proper treatment and removal of which may cause prompt amelioration and cure of the ocular and nasal conditions, without the need of other than the mildest local treatment.

The narrow viewpoint of the specialist was recently illustrated while discussing, with a distinguished professor of operative dentistry, the association of maxillary sinusitis with diseased teeth conditions. He, stoutly maintaining that every such case was due to the teeth, and I think accepted, with considerable qualification, the writer's definite statement that about 75 per cent of such conditions were entirely disassociated with any dental disease.

Since the subject of accessory sinus disease, from the rhinologic standpoint, was so admirably reviewed in a

recent symposium before the members of this section, participated in by such authorities as Skillern, Grayson, Vansant, Coates, Gleason, Wood, Eves, and others, it is my purpose to approach it in the main from the ocular viewpoint.

The rhinologist will unquestionably maintain that many cases of sinusitis are entirely minus any ocular signs, and, indeed, most of us will agree with so careful an observer as Jessop of London, when he suggests that, at times, there are no characteristic visual changes associating these two contiguous structures. Bryan of Washington believes that the majority of all the severe inflammations of the accessory sinuses are accompanied with more or less disturbance of the eyes, the variations being, as a rule, governed by the severity of the sinus disease; and that they are not discovered early because not adequately sought until ocular symptoms develop.

F. E. Brawley of Chicago, a painstaking observer and student of these associated conditions, maintained as early as 1907 that every case of intra-ocular disease should be accompanied by a careful study of these contiguous cavities. Even a partial review of the literature will make most of us willing to assume the advanced position recorded by the late lamented Reber, that all manner of extra- and intra-ocular disease is, at times, traceable to nonsuppurative and suppurative pathologic processes in these contiguous nasal sinuses, and will certainly justify the observation that in all ocular diseases of obscure origin the sinuses should be studied, and if ocular signs justify it, treatment of the suspected sinuses is indicated, even in spite of a negative rhinologic report.

It is a fact that the careful special testing of visual function, and the finding of certain changes in the visual field, may establish a diagnosis before nasal symptoms have been sufficiently marked to attract attention; and further, it is not infrequent for closed empyemas and mucocoeles to give a false sense of security by an almost total absence of nasal symptoms, notwithstanding the presence of ocular

change. It is quite impossible, in a comparatively brief consideration of the subject, to refer adequately to a very extensive literature which has accumulated during the last ten years, much of which may be classed as intensive and epoch making.

#### MANNER OF ASSOCIATION.

Onodi, as is perfectly well known, has given special impetus to the whole subject we are considering by his contributions, which include a study of the oculo-orbital, intracranial and cerebral complications, as well as by his published anatomic studies of the relations of the posterior sinuses to the normal and anomalous proximity to the optic nerve. The anatomic studies of H. W. Loeb<sup>2</sup> likewise furnished illuminating data regarding the relation of the posterior sinuses to the nerve and chiasm, this distinguished writer having advised us that more than half of the nerve was included in the sinus portion. The important relationship between the orbits and the sinuses, in the anterior segment of the skull, was the subject of an important communication by Dr. Samuel D. Risley,<sup>3</sup> concerning abnormalities of ocular balance; it being even then recognized that departures from the normal contour in sinus development furnished a strong predisposing cause of interference with sinus drainage.

The strategic position occupied by these nasal sinuses with reference to orbital attack, by way of the roof-floor and inner wall, through the actual giving way of their thin, bony and mucoperiosteal partitions (and, indeed, in the case of the ethmoids, the existence of so-called dehiscences mark the absence of any but the latter protection), makes the direct extension by pressure, erosion and necrosis, or through the interstices, readily understood. Adhesions may occur between the orbital periosteum and the optic nerve sheath, and these adhesions may be vascularized, offering a direct route for ocular infection (Brawley).

It is quite unnecessary in this presence to trace the ophthalmic artery in its ramification from the orbit into the ethmoid and frontal cells, nor the re-



turn journey of the ethmoidal veins into their ophthalmic reservoir. Again, the intimate association of the ciliary system need scarcely be urged as pointing to the ease with which a toxemia may reach the eyes. With the role played by the fifth cranial nerve in ophthalmic, sinus and intracranial disease, you are also entirely conversant. The role of the lymphatics and the lymphatic sheaths of the nerves should be given emphasis in tracing the likely routes of infection. Regarding the latter method of transfer, it is claimed by Miodowski, as the result of his work in the clinic of Professor Briegar of Breslau (quoted by Freudenthal), that, by reason of their anatomic features, they should be and, he believes, are the best reservoirs of all invading bacteria.

It would be very desirable, if it were possible, to separate the ocular symptoms induced by sinus disease into two definite groupings, the anterior and posterior. The anatomic association, already referred to, as well as the numerous clinical reports at our service, will serve to indicate the impossibility of any such dogmatic differentiation. The routes of ocular involvement, secondary to rhinogenous disease, will be then—

- 1—By continuity.
- 2—By way of the blood vessels.
- 3—By way of the lymphatics.
- 4—By way of the lymphatic sheaths of the nerves.

OCULAR SYMPTOMS, the result of abnormalities in the nasal mucosa, have long been an established fact, entirely apart from the presence of pus producing organisms. Differences in the power of accommodation in the two eyes have frequently been relieved as recorded by such authorities as Ballenger, Stucky, Pynchon and others, by the removal of nasal pressure in a partial excision of a hypertrophied middle turbinal. The disappearance of blepharospasm by the same procedure is a likewise generally recognized observation. Lacrimal disease from epiphora to blennorrhoea may easily be associated with mechanical obstruction of the

nasal end of the duct. Indeed, the vicious role played by the duct, in the transfer of infection to the cornea, is a generally conceded possibility. S. Lewis Ziegler claims that upwards of 90 per cent of corneal ulcers are due to nasal conditions.

Blepharospasm, dacryocystitis, photophobia, epiphora, ocular pain and reflex ocular disturbance, expressing itself in so-called asthenopia, have many times found a causative factor in nasal congestion, spurs, tumors, ulceration, hypertrophied or polypoid-turbinal degeneration; and from contraction of nasal synechiae caused by the too vigorous use of the cautery. H. C. Parker, in a review of these associated conditions, believes 50 per cent of them are caused by nasal disease. Ziem and Kuhnt have traced iritis and cyclitis to a nasal origin. Parker has found improvement in refractive defects to follow the lessening of ciliary irritation and congestion by nasal treatment; and few oculists today attempt to treat phlyctenular disease of the conjunctiva or cornea, without taking into account the condition of the nose, the tonsils and the adenoids.

Stauffer of Salt Lake City has noted deep ciliary injection to be present in nearly all high deflections, with pressure on the middle turbinal. A number of writers, among them Griffin and Haskell, have recorded observations pointing to the vascular or reflex connection between nasal hypertrophies and glaucoma, the latter disease being greatly relieved by the removal of the thickened vascular structure. Middle turbinal pressure may be either against the septum or antral wall, and a number of well known authorities insist that if pressure prevents free ventilation and drainage, the turbinal should be removed, even though it presents no pathologic changes, as the negative pressure, thus induced within the ethmoid or frontal, will eventually lead to pain, pus formation and ocular disturbance.

If the conditions briefly outlined are productive of evident ocular symptoms, it is surely not a far cry to the more

profound lesions that may easily accompany the deeper sinus congestions, mucocoeles or empyemas. The sinus involvement may run the gamut from a simple hyperemia to catarrhal inflammation, suppuration and necrosis, and each form may be, and frequently is, accompanied by ocular symptoms.

Perhaps the simplest form of ocular discomfort which is apt to succeed a congestion of the nasal mucosa, with obstruction of the normal sinus outlets, as pointed out by Parsons,<sup>4</sup> is a unilateral headache, with pain and some tenderness at the upper, inner orbital angle, aggravated by stooping; with or without some vertiginous sensation, congestion of the conjunctiva of lid and eye-ball with lachrimation, muscular twitchings and discomfort upon attempting to use the eyes for near work. The latter symptom will probably draw attention to a refractive defect, which in itself may be an entirely minor element in the causation of the condition.

The vicious circle thus set into action, with the induction of so-called negative pressure within the sinuses, is a common observation. Middle turbinal pressure against the septum may be the contributive cause, and recurrences may make it necessary to excise it in part. As a rule, the acute cases of sinus disease are not seen by the ophthalmic surgeon, as the family physician and nasal specialist are those consulted during the earlier manifestations, and unless the infection is an especially virulent one, causing external violent ocular symptoms, the opportunity to examine such expressions of disease is only afforded well on in the subacute or chronic stages.

The usual types of eye involvement in acute and chronic sinus disease are those with external manifestations, edema, cellulitis, abscess; those without external signs, but manifesting definite lesions of the ocular fundus; those with corneal, iritic, ciliary or general uveal inflammation, and even glaucoma; those exhibiting the pressure signs of mucocoeles and finally the unilateral pain and headache due to rarefaction of air in frontal or ethmoid,

often expressing itself as violent asthenopia with or without definite pupillary, parietic or paralytic muscle phenomena.

#### SYMPTOMS.

The ocular symptom of sinus disease, to which I will first direct your attention, is *edema of the eyelids*, on one or both sides, usually unilateral. Gerber claims it to be a very early symptom of orbital involvement. It may be present for prolonged periods, at times being typically fugitive and recurrent, varying from a slight flushing to a marked swelling of red or brawny type. Dr. deSchweinitz<sup>5</sup> in 1910 emphasized these fugacious appearances as pointing just as definitely to sinus disease as the common edema more generally present. They are usually accompanied with unilateral pain, supraorbital neuralgia, and frequently with burning on the affected side of the face, and can be an expression of disease in any one of the four sinuses, but are thought to be conspicuously evident in acute ethmoiditis and frontal sinuitis. Edema tends to lessen as drainage is established, and if due to either of the latter sinuses is apt to be less in evidence at night and more in the morning. There is no doubt, however, that even a casual review of the literature will definitely place the maxillary sinus in the role of causation. Onodi, di Giuseppi, di Tito, Rollet, Genet, Freeman of this city and others have reported cases. In Freeman's case it was caused by only a few drops of pus in the sinus. If due to disease of the maxillary antrum the edema should be more marked during the day, if the patient is in an upright position.

This symptom must be distinguished from that caused by incipient hordeolum as well as from the edema of an acute dacryocystitis, that from lid furuncle, or from the deep infiltration that precedes an abscess of the lids. The edema, accompanying periostitis of the orbital margin, can, as a rule, be diagnosed by the hard character of the underlying swelling. In erysipelas the swelling and redness are uniform, the skin feels thicker and harder, and circumscribed infiltration is absent. The



swelling occupies both lids as a rule and usually extends to the neighboring parts. The recurring angioneurotic edemas allied to urticaria, and often associated with disturbances of the menstrual period, must be considered as well as those symptomatic of migraine. The edema accompanying acute eczema is also worthy of note. The noninflammatory lid edemas, associated with cardiac disease and nephritis, often appearing under the guise of edema fugax, must also be differentiated.

The edema of acute blennorrhoea and diphtheria of the conjunctiva, iridocyclitis, uveitis and glaucoma, are, as a rule, readily eliminated. The edema of a retrobulbar phlegmon, or that expressive of a severe orbital cellulitis or abscess secondary to frontal or ethmoidal empyema must be, if possible, differentiated from the early orbital manifestation of thrombosis of the cavernous sinus. In thrombosis the lid and conjunctival swelling are marked, the eyeball is protruded and moves with difficulty, the retinal veins are enormously dilated and there is apt to be a doughy edema in the mastoid region.

In sinus thrombosis the edema and swelling are frequently bilateral and this is rare in sinus disease. Thrombosis is apt very promptly to lead to cerebral symptoms and a fatal issue. On the other hand, suppuration in the posterior ethmoid cells and maxillary antrum may, according to Fuchs, lead to sinus thrombosis, hence it will be readily understood how difficult at times absolutely accurate, differential diagnosis becomes. Our edema study can easily become more complex by the development of a meningitis, in association with oculo-orbital disease of rhinogenous origin, and this connection has been exhaustively studied by P. H. Gerber,<sup>6</sup> with an analysis of fifty-one cases from literature, as well as by Onodi, in his well known work.<sup>7</sup>

To these have recently been added two cases by Dr. Samuel Leopold of our city, one with oculo-orbital symptoms and a second with rapid brain involvement from influenza, without demonstrable ocular signs. The first illustrated an intermittent frontal si-

nuitis with a final meningitic attack, and the second quickly terminated by a sudden apoplectic attack. A third slow, insidious, protracted form is distinguished. When ocular complications are present, we may have disease of the inferior sinus wall or orbital roof. Thrombophlebitis may indirectly produce leptomeningitis. Here again Leopold believes the lymph channels may play an important role.

In both tenonitis and orbital cellulitis, secondary to sinus disease, edema of the lid and conjunctiva and proptosis of the eyeball are present. Again, according to Fuchs, if the chemosis is pronounced and the proptosis slight, tenonitis is probably in evidence. The opposite condition of affairs points to the deeper involvement. Dr. Posey refers to a collateral inflammatory edema of the upper lids and orbit accompanying a periostitis in the presence of acute frontal and ethmoidal sinusitis, in which an exploratory puncture showed the presence of pus, under the periosteum, but which on incision gave no added purulent matter.

Actual blackening of the lids, at times, occurs, suggestive of an ecchymosis, and this, as the edema, may be also recurrent. The value of this symptom was emphasized by deSchweinitz in his paper, "Some observations of the ocular manifestations of sinus disease,"<sup>8</sup> and again in discussing Dr. Bryan's<sup>8</sup> paper before the College of Physicians. The appearance and disappearance of these lid manifestations are obviously dependent upon relief from and obstruction to drainage in frontal, ethmoidal and antral empyema.

Congestion of the conjunctiva and lacrimation are very frequently present, the former extending at times to a definite conjunctival catarrh. Emphasis must also be placed upon the presence of a fugitive episcleral congestion, resembling the episcleritis periodica fugax of Fuchs, or the Hutchinson "hot eye." The dilated and tortuous episcleral vessels are deeper in hue than those of ordinary episcleritis, are said not to bleach under adrenalin, and are apt to be accompanied with very violent headache. These attacks



may last for weeks, as in a case reported by de Schweinitz, before the cause is suspected.

#### OCULAR INFLAMMATION.

To these may be added curious corneal phenomena mentioned by the same writer, namely, edema of the corneal epithelium, resembling that induced by cocain or a so-called wrinkling of the cornea. Posey and Gerber have seen herpetic eruptions associated with sinus disease. Of the inflammatory ocular conditions, as is well known by every ophthalmic surgeon, none is at times more baffling than uveitis and irido-cyclitis. One of the earliest reports associating this condition with sinus disease was by Dr. Posey in 1897.<sup>9</sup> The eyes of a laundry worker became blind and the ball shrunken from a violent uveitis, the nasal and sinus condition being due to inhalation of acid fumes. The involvement of the cornea, iris, ciliary body and choroid, constituting this well known uveal picture, may have a very varied etiology; as syphilis, tuberculosis, enterogenous intoxication of intestinal origin, gonorrhea and the toxic products from a diseased tooth, mouth, tonsil, skin, uterine cavity or accessory sinus. It is perfectly possible that two of these sources of infection may be present at the same time, but since Ziem, Eversbush (quoted by Brawley), and many other observers have associated these conditions with sinus disease, no study is complete that lacks sinus consideration.

Disease and abscess formation in the region of the lacrimal sac, giving the symptoms strongly suggestive of lacrimal mucocele, may be the so-called pre-lacrimal abscess and have their origin in the lacrimo-ethmoidal cells. Alterations in refraction, the result of pressure from a dilated sinus, is not an infrequently recorded observation; and ciliary spasm and congestion, the outcome of nervous and lymphatic influences, may likewise contribute to the production of this phenomenon. Stewart of Portland<sup>10</sup> has seen three-quarters of a diopter of astigmatism against the rule disappear, after surgical treatment of a sinus.

I am entirely in accord with the view that these and many others of the associated ocular and nasal conditions of indeterminate origin, but with at least a relaxed turgescence or so-called vasomotor hypertrophy, may and should be relieved by general upbuilding, with iron, as suggested by MacWhinnie, or other tonics; and supplemented by exercise, a change of climate, intestinal antiseptics and laxatives with appropriate local nasal treatment, with which you are all familiar, before operation is undertaken.

#### INFLAMMATORY ORBITAL SYMPTOMS.

Inflammatory conditions of the orbit are present in and the result of nasal sinus disease in 60 per cent of the cases, according to Birch-Hirschfeld of Leipsic, and indeed other authorities assign an even more important role to them in the induction of orbital cellulitis. Posey, for example, maintains that fully nine-tenths of all cases of cellulitis are secondary to sinus affections, and St. Clair Thompson<sup>11</sup> believes we should cease to regard orbital cellulitis as primary, and should look to the nose and accessory sinuses for the infection. The inflammation often persists, notwithstanding the establishment of drainage by reason of the orbit being a closed cavity. The acute or chronic purulent sinusitis was due in Hirschfeld's cases to rhinitis, influenza, pneumonia, scarlet fever, diphtheria or traumatism.

The more frequent route of orbital infection from accessory sinus inflammation is by way of the floor of the frontal, the os planum of the ethmoid and the roof in the maxillary sinus, the symptoms varying as the condition is acute or chronic. In the acute variety the eye-ball is tender, there is usually pain upon rotation, a so-called orbital neuralgia, especially upon concentrating the gaze, and tumefaction at the upper inner or inner angle, involving the inner third or half of the eyelids.

If the fundus can be seen the veins will be full, the edges of the disc veiled, the surface of the nerve too red, or edematous; with confusion of sight, diplopia, edema of lids, conjunctival chemosis, periorbital pain increased

upon pressure, dimness of vision, and a varying proptosis of the eye-ball, depending somewhat upon the primary source of the swelling, being forward, downward and outward in frontal sinusitis, with limitation of upward and inward movement, more nearly directly forward in sphenoid disease; and forward, downward and inward (Sküllern) in ethmoiditis.

The completion of the symptom complex will be dependent upon the degree of cellulitis and its extension into an orbital abscess. The rapidity with which an orbital cellulitis secondary to an acute ethmoiditis may proceed to a fatal issue is illustrated in the case of Clegg, in which a girl of nineteen, previously perfectly well, developed sudden headache and vomiting, with great edema of the lids and reduction of vision to light perception. Temperature and pulse were normal. Drainage of orbit brought temporary relief, but death ensued in four days.

Hilfrich,<sup>12</sup> in a paper upon "Intra-orbital Complications in Acute and Chronic Accessory Sinus Disease," emphasizes the fact that swelling of the contents of the orbit, causing protrusion, limitation of movement of the eyeball, diplopia and headache, marking the acute onset of exophthalmos, may be at times the only external sign of accessory sinus disease. Mucocoeles from the frontal and ethmoid are apt to be marked by the presence of a quiet tumor at the upper and inner or inner aspect of the orbit, dependent upon the involved sinus without active inflammatory symptoms, causing displacement of the orbital contents with resulting exophthalmos down and out. This may be combined with polypoid formation and evident ethmoid disease; or, as in a case of Reber's, can exist with an entirely negative rhinogenous finding. In the latter case a spray of antipyrin, cocain and adrenalin several times a day for about ten days suddenly resulted in a gush of thick, jelly-like fluid from her throat, causing a complete disappearance of all the symptoms. These mucocoeles may result in a periostitis of the frontal floor or over the os planum. A sub-

periosteal abscess may result and may either be encapsulated or penetrate the skin of the lid.

Axenfeld maintains that the distinction between osteoma and mucocoeles, many of the symptoms of which are allied, may be made by the X-ray. The enlargement caused by mucocoeles is often of almost bony hardness, suggesting an exostosis. A tense parchment-like appearance is apt to be followed by crepitation or fluctuation. The slow growth permits an ocular adjustment, therefore there is frequently no diplopia and the failure of the optic nerve to show any radical departure from normal is explained by its straightening at the sigmoid flexure without pronounced stretching.

Gummata of the upper inner angle of the orbit may present symptoms closely simulating mucocoele distension, as in a case of Zentmayer's and a second of F. C. Parker; and here, when doubt exists as to each diagnosis, the modern syphilis tests are invaluable. The ocular changes secondary to sinus disease appear usually in adult life, but a number of well recorded cases appear in infancy and early childhood.

Dr. Frederick Krauss and William Campbell Posey of this city have reported cases of orbital abscess secondary to maxillary sinusitis. In Dr. Krauss' case the disease appeared at four months and in Posey's between one and three years. Posey had originally regarded them as osteomalacial in origin. Onodi records the size of the maxillary sinus at one year of age as 5 by 3 millimeters, up to 19 by 8 millimeters in size, and in fetus of 6½ months the same author found a maxillary sinus 3 by 1.5 millimeters.

#### OCULAR MUSCLE INVOLVEMENT.

This aspect of the subject has been carefully elaborated by Sauvinau, Peyser, Galezowski, Bernheim, Posey, Reber and others. Interference with the mobility of the eye usually results from mechanical displacement associated with a distended sinus wall, or from the presence of exudation, yet asthenopia and paretic or paralytic conditions of the ocular muscles do occur in sinusitis entirely apart from such



displacements, and occasionally may be an accompaniment of even a mild sinus involvement. These later cases, as Bernheim and Skillern suggest, are apt to be the result of the selective action of a toxin, just as is true of the infectious diseases, autointoxication and influenza.

The anatomic relations will readily point to the frontal cells as responsible for involvement of the superior rectus, superior oblique and the levator, and Sauvigneau has associated the internus and accommodative muscle involvement with frontal disease, although the lack of power in the interni usually points to ethmoidal disease, and that of the inferior rectus and inferior oblique are most apt to indicate antral disturbance. The intimate association of the nerves which supply the ocular muscles with the outer wall of the sphenoid will readily explain in part the muscle disturbance, and disease of the sphenoid is regarded by some authorities as the most frequent cause of muscle involvement of sinus origin. The ethmoid, frontal and antrum probably offend in the order mentioned.

In acute cases paresis or paralysis are occasioned by direct inflammatory infiltration of the long flat belly of the muscles themselves as they lie close to the sinus walls, or by involvement of the nerves as they enter the orbit. In many instances diplopia is not complained of, but is detected by the red glass and a search in the peripheral field. Diagnostic help is gained by noting the pain when the eye is turned in the position that calls forth the greatest movement of the affected muscle. The use of the eyes is difficult and painful, confusion of vision, vertigo and reflex gastric disturbance are frequently present.

Alternate dilatation and contraction of the pupil is reported by McBean<sup>13</sup> of Chicago in a paper upon variations in the sphenoid sinus; and two cases of pupillary dilatation in sphenoid disease are reported by Sluder. The condition was one of acute sphenoiditis in McBean's case, with pain back of eye and in occiput with severe asthenopia. In a few days wide dilatation of the pupil was followed by myosis, with spasm of accommoda-

tion. All local medication was resisted, and the case cured by an autogenous vaccine. McBean regards the explanation of the phenomenon as an irritation of the carotid plexus of the sympathetic, producing mydriasis, and considers that later motor oculi irritation produced myosis. Baumgarten and Lapersonne are quoted by Onodi as also having seen oculomotor paresis and paralysis from sphenoidal disease.

The picture of complete palsy of the levator palpebrae (right) from frontal sinus empyema is apt to include severe neuralgic pain in the supraorbital and frontal region with marked tenderness upon tapping. The globe movements were unrestricted. Conservative treatment to the frontal sinus by Dr. George B. Wood in this instance caused a rapid improvement. The close apposition of the muscle to the sinus floor and the absence of sphenoid and ethmoid disease established a diagnosis of direct involvement. It is not always easy to differentiate between edema and paralytic ptosis, each at times being fugacious and recurrent.

In the more chronic types of sinusitis, the disturbance of the eyeball is slow, because the sinus distension is very gradual and the muscles adjust themselves to varying conditions. The so-called rheumatic ocular palsies are thought by a number of authorities to be more often due to sinus disease. It is perfectly well known that many of these ocular palsies are due to specific disease and every oculist of experience has seen cures result from large doses of the iodides. But if the possibility of sinus origin be kept in mind we will frequently produce a rapid cure by the sinus route.

#### OCULAR FUNDUS CHANGES UNACCOMPANIED BY EXTERNAL INFLAMMATION.

An exhaustive ophthalmoscopic and peremetric examination becomes of especial importance in those cases of sinusitis in which changes in the fundus oculi are present without any external signs of orbital or ocular inflammation. These changes may be a retrobulbar neuritis—a papilledema or choked disc, an optic neuritis, neuro-retinitis, thrombosis or phlebitis (de Schweinitz), retinal detachment, and finally definite blind or



blurred areas in the visual field, without ophthalmoscopic evidence of ocular disease.

The areas of greatest significance in the study of intraocular disturbances are two in number; first, the macula with its acute recognition of white and color, and second, the optic nerve at its point of entrance into the eyeball, the latter being the so-called "silent" area or the blind spot of Mariotte. The presence of symptoms of optic nerve involvement (as emphasized strongly by distinguished authorities) are the most dangerous of the sinus pointings and if not relieved by suitable drainage may be followed by atrophy. If these changes are unilateral they especially call for sinus study.

The importance of repeated field examination in arriving at a more definite diagnosis is emphasized by such a case as reported by Heed, where a female of 39 complained of blurred vision and vertigo, and in which a fundus examination showed only a suspicious hyperemia of the disc, but with normal fields. Five days later an active neuritis with contracted fields existed. Treatment to the ethmoid cells caused a rapid cure.

The presence of a central scotoma, in the absence of any demonstrable ocular involvement in the media, retina or choroid, points definitely to a macular lesion; and is pathognomonic of an axial orbital or retrobulbar neuritis, which is ordinarily caused by the circulation of an infecting agent in the blood; this toxemia inducing an interstitial inflammation of the so-called papillo-macular bundle of the nerve, most marked in the optic canal. For these fibres certain toxic products have a special affinity, and the scotoma when present is usually first for colors and later for white.

This toxemia, as a rule, results in a temporal pallor of the disc, but the discovery of the scotoma precedent to the change in the appearance of the disc usually points to the need of immediate improvement of sinus drainage, and hence may warrant operative interference when no demonstrable signs of sinus disease are present. If the infecting agent manifests its baneful influence on the intraocular end of the nerve as a choking of the disc, an actual neuritis or further

extension into the retina, these significant ophthalmoscopic pictures can readily be determined.

The perimetric findings associated with, or the direct outcome of sinus inflammation, have been carefully studied by a considerable group of observers, prominent among whom are: Birch-Hirschfeld, Fuchs, Jessop, Ziem, van der Hoeve, de Kleijn, Markbreiter, Ramsay, Southerland, Samuel D. Risley, de Schweinitz, Knapp, Reber, J. Norman Risley, MacWhinnie, F. J. Parker, Fridenberg and Peter.

There may be concentric or irregular contractions both for form and colors, and occasionally bitemporal hemianopsia, (Evans-Birmingham.) but the scotomas of varying types are more generally present, have more diagnostic significance, and those of the so-called peripapillary variety have been regarded by some observers as practically pathognomonic. As the sinuitis is more usually unilateral, so is the central scotoma. This fact has received special emphasis by Weeks of New York; but this will, of course, vary with the extent of the sinus involvement and may be bilateral and be present both for form and colors. The scotomata of the more usual toxic varieties caused by the various systemic toxemias are much more apt to be bilateral.

In our study of central scotoma three important groups, representing varying types of causation, must be considered from a differential viewpoint. First—Toxic amblyopias caused by alcohol, tobacco, lead, arsenic, iodoform, stramonium, carbon dioxide, mercury, opium, male fern, etc. Second—Intestinal toxemia, syphilis, tuberculosis, diabetes, gout (so-called), gonorrhea, influenza, malaria, the infectious fevers. Third—The mouth, teeth, tonsils and accessory nasal sinuses; and it has been generally believed that the posterior sinuses are the special offenders.

It must always be kept in mind that one or more of these systemic conditions may be responsible for a toxemia which induces the nerve changes, or may result in the sinus empyema, which in turn may be the direct excitant of the nerve or retinal lesion. Hillitzer<sup>14</sup> believes optic nerve conditions due to involvement of

the ethmoid, and sphenoid sinuses are as a rule diagnosticated by exclusion.

In the absence of intoxications, with a negative Wassermann, the presence of an axial or retrobulbar neuritis acute or chronic (especially if unilateral since in the former condition the nerve disturbance is usually bilateral) the possibility of a disseminated sclerosis should be carefully considered; and under such conditions disturbances of gait, sensation, and reflexes should be studied; and indeed if a sinus infection is present, such as ethmoiditis, combined with the symptoms of disseminated sclerosis, as was true in a case reported by Shumway, the possibility of the toxin from the purulent focus causing the nerve degeneration as suggested by that author must likewise be kept in mind.

The differentiation between the fields of vision of intraocular states due to sinus disease; and those due to or associated with general toxemias, in which no sinus disease was suspected nor present, are, as pointed out by S. D. Risley, sometimes exceedingly difficult to make.

Central scotoma, narrowing of fields, edema of fundus, veiling all details, large dark tortuous veins, hemorrhages in fibre layer of retina or at the macula may be present, and yet it may be impossible to demonstrate sinus disease. On the other hand, all the above symptoms may be present in association with disease of one of the sinuses in the anterior segment of the skull; and it is not always easy to say they were caused by it, as both the sinus and ocular disease were associated with, and probably caused by, the same systemic toxemia.

Paracentral scotomas of horseshoe shape disappearing in segments, are described by MacWhinnie and a similar variety is emphasized by de Schweinitz, the paracentral often becoming hemianopic and resembling the hemianopic scotoma of Treitel.

The crescentic field defects such as were reported by the same author, in a case of posterior ethmoiditis combined with tooth abscess, may be part of a ring scotoma, either previously present or not yet completely formed and easily influenced by measures to remove the toxemia, that is to say, treatment of sinus and tooth.

The ring scotomas may become central and usually improve and disappear with adequate drainage unless permanent damage has resulted from the pressure or toxemia.

The presence of a ring scotoma, according to MacWhinnie (quoted by Fridenberg), would indicate accessory sinus involvement even when the retained infection was not evident to the probe. When inspection of the nose points to definite sinus involvement, especially posterior, a typical field will be an enlargement of the blind spot and a paracentral scotoma.

The nerve lesions in central amblyopia consist in edema and proliferation of the glia cells, and later possible destruction of the nerve fibres (Birch-Hirschfeld). The cause, according to Birch-Hirschfeld, is venous stasis and toxic agencies.

Bryan believes that nerve toxemias can be caused by mucocoeles, as well as by abscesses; and the symptoms, often extremely difficult to explain, may be the result of anomalies in the posterior cavities. The sphenoid may be in relation to both nerves. The posterior ethmoid may be on the other hand in close proximity to one and not to the other; and furthermore, it is Bryan's opinion that the presence of bilateral nerve involvement may be explained by transference by way of the chiasm without necessarily indicating the presence of a bilateral sinuitis.

In such a study as this special emphasis should be laid upon the work of van der Hoeve and its further development and confirmation by de Kleijn. The enlargement of the blind spot constituting the so-called peripallary scotoma, of van der Hoeve has been thought to be pathognomonic of involvement of the posterior group of cells (sphenoid and posterior ethmoid), this toxemia expressing itself upon the peripapillary bundle as the first portion involved in a retrobulbar neuritis.

In attempting to outline a van der Hoeve phenomenon it must be remembered that the optic nerve, as it enters the eye, has no ganglion cells, no rods nor cones, and is therefore blind. This blind spot is located  $15^\circ$  to the temporal side of the actual point of fixation. In hyperopic



eyes it is further away, as far as  $19^{\circ}$ , while in myopic eyes it is down to  $11^{\circ}$ . As to the important question, what actually constitutes an enlargement of the blind spot, van der Hoeve considered over  $6^{\circ}$  in the horizontal diameter as suspicious and over  $7^{\circ}$  as too large.

Van der Hoeve found the peripapillary scotoma only in posterior sinus disease, and maintains that central color scotoma always secondary to sinus disease, appeared later if at all; whereas, in toxic retrobulbar neuritis this symptom and the van der Hoeve scotoma were present simultaneously. De Kleijn noted that the enlargement of the blind spot for colors, preceded that for a white. The presence of this symptom according to some authorities justifies operation on the affected sinus, if no other cause for the blind spot enlargement can be found.

These deductions we will probably modify by reason of the more recent work of Markbreiter in an important paper on the changes in the visual fields in diseases of the nose and accessory sinuses, in which he reported results of investigations of the field in one hundred cases of empyema, carefully excluding all cases in which the eye itself manifested any changes that might cause any visual field disturbance.

In this series of cases sixty-three involved the anterior group of cells; and of these seventeen were frontal and thirty-one maxillary, three anterior ethmoid and frontal, nine involved the posterior group, three were cases of pansinusitis, and in the remaining twenty-five the exact location is not specified.

Visual field changes were found in seventy of the hundred cases, although the fundus in each case was normal and the vision perfect. This, it seems to me, is a very important observation. In the anterior empyemas, field changes were present in forty-eight out of sixty-three cases and in seven out of nine in the posterior group.

Of the seventy cases of defective fields the blind spot enlargement was present in fifty-two, seven showed central, and eleven other forms of field defect, such as island, ring defects and peripheral contraction. Markbreiter has never seen enlargement of the blind spot pass into cen-

tral scotoma. In eleven out of thirty-seven nonsuppurative diseases of the sinuses, field changes were present.

The further important deduction from this study is, that while enlargement of the blind spot constitutes the most frequent of the nerve manifestations of accessory sinus disease, it presents no diagnostic features by which we can positively say whether the anterior or posterior group of cells is involved.

The fact, however, that enlargement of the blind spot may sometimes be present either with or without surrounding rings of color scotoma, and the further fact that these scotomas may antedate by some considerable time organic changes in the nerve head or other gross ophthalmoscopic alteration, is an exceedingly important observation of van der Hoeve, de Kleijn, Onodi, and has been confirmed by a number of American observers (de Schweinitz, Norman Risley), and while it may not definitely indicate which sinus or group of sinuses is involved, it constitutes a very significant sign post in the direction of sinus disease.

Optic neuritis and neuro-retinitis may be caused by an inflammation of any of the nasal sinuses. In a case reported by Arnold Knapp resection of the anterior half of the middle turbinal and curetting of the posterior ethmoid caused a return to normal vision and fundus, and eliminated a central relative scotoma for white and colors.

An optic neuritis, in which the summit of the disc was plus four, with an ocular proptosis and reduction of vision to one-fifth of normal, in which frontal ethmoidal drainage by incision under the orbital rim from a point under the middle of the front inward to the nasal front and downward along its border with complete recovery, was reported by Dr. Risley. This procedure was adopted in 1903 and the patient whom I saw this past week has scarcely any deformity, and normal vision. This author much prefers the procedure here adopted as offering adequate drainage and a very inconsiderable scar.

Monolateral optic neuritis may exist for a prolonged period with normal vision, as in the case reported by Rau, where systemic treatment caused



marked improvement in a case lasting a year. Recurrence was noted in two years with decreased vision, frontal headache and pain on percussion over the frontal sinus. Examination now showed a maxillary sinusitis of the same side, operation upon which cured the neuritis and largely restored vision. This case emphasizes the fact that pain is not an absolutely reliable guide, as none was present over the maxillary and all over the frontal.

The tolerance of the optic nerve and retina to interference of toxic products of, or direct pressure from, ethmoidal empyema, is well illustrated by a case reported by Dr. S. D. Risley ten years ago, before the association of these conditions was by any means so generally recognized. It likewise confirms an equally important observation that the ordinary depleting absorbing and eliminating measures so generally applied to cases of neuro-retinitis, with flame shaped hemorrhages and contraction of the field will frequently cause amelioration of all the symptoms. The recrudescence of the ocular condition in this instance caused the consulting neurologist to fear intracranial involvement. Operation on the anterior ethmoid cells and consequent drainage of frontal and ethmoid resulted in a complete cure, the latter not having been performed for two years after the initial symptoms.

I venture the opinion that all of us today would immediately take the sinuses into account at an initial visit in the presence of a unilateral neuro-retinitis with or without hemorrhages. The case of a physician recorded by Parker of New York, with concentric contraction, central and van der Hoeve scotomas varying with the condition of the sphenoid and posterior ethmoid cells combined with double papilledema is of special interest. The maxillary antrum was also involved, but the cure of the ocular condition followed operative treatment directed to the ethmoid and sphenoid sinuses, vision at one period being reduced to shadows in each eye and returning to normal only when the last posterior infected cell had been drained.

Retinal thrombosis as symptomatic of sinus disease is referred to by a number

of writers. Wendell Reber reported a case of thrombotic involvement of the central retinal vein, which was negative to all types of examination, even rhinologic. In his characteristic phraseology, he pictures the nasal disease as sweeping in, doing its damage and possibly disappearing by the time the retinal disease is apparent.

Notwithstanding a negative examination so far as empyema was concerned, he insisted upon rhinologic local nonoperative treatment and a cure resulted in four weeks. Reber believes many of these cases of thrombosis of the central vein are due to undiagnosed latent obscure sinus disease which need not be purulent.

In this perhaps too prolonged recital many vital points have been left for consideration and review by the specialists present, whose extensive experience and reputations entitle their pronouncements to the most distinguished consideration.

These subjects include the importance of blood study with hemoglobin determination and differential count, the relation of blood pressure, intestinal toxemia and the varying infections, the conservation of tissue as opposed to its destruction and removal, the value and limitation of vaccine therapy, the bacterial study as indicating the extent to which conservative treatment is justified, the limitations of X-ray and transillumination as adjuncts to accurate diagnostic study, the best conservative nasal treatment, which, according to one author (MacWhinnie), will cure 97 per cent of these cases, the value of suction in the conservative management, and finally, the most approved operative intervention so often essential to the preservation of vision and at times to the prevention of meningitic involvement.

The important opinions of the participants in the discussion of the evening have been dug out of the mines of the years of toiling in an effort (in the apt phraseology of Edward Jackson) to "Push back the ever widening margin of the unknown." If our interdependence in our closely allied fields of endeavor has been given an emphasis, the purpose of the writer will have been achieved.

## BIBLIOGRAPHY.

1. Brawley. Jour. Amer. Med. Assn., March 23, 1907.
2. Loeb. Ann. of Otolaryngology and Rhinology, June, 1909.
3. Risley. Int. Ophthalmological Congress Edinburgh, 1894, p. 258.
4. Parsons. Jour.-Lancet, 1913, p. 332.
5. de Schweinitz. Tr. Amer. Ophth. Soc., 1910, p. 477.
6. Gerber. Komplikation der Stirnhöhl, 1909.
7. Onodi. Pathologie und Therapie der Nasenkrankheiten, 1910.
8. Bryan. Ophthalmic Record, v. 21, p. 11, Tr. Coll. Phys., Philadelphia, vol. 33, 1911.
9. Posey. Tr. Coll. Phys., Philadelphia, 1897.
10. Stewart. Ophthalmic Record, 1910.
11. Thompson St. Clair. Ophthalmoscope, 1908.
12. Hilfrich. Zeitschr. f. Ohrenkrankheiten, p. 31.
13. McBean. Annals Otolaryngology and Rhinology, 1914.
14. Hillitzer. Wiener klinische Rundsch., Oct. 8, 1911.

## NOTES, CASES, AND INSTRUMENTS

In this department will be published brief reports of cases, descriptions of new instruments, and suggestions of interest to ophthalmologists.

### ATROPHY OF THE IRIS.

FRANK ALLPORT, M. D.

and

JAS. R. SMITH, M. D.

CHICAGO, ILL.

On account of the infrequency of this interesting pathologic condition, we desire to report two cases of atrophy of the iris. There are few cases of this kind reported, and various observers have reported essential differences—both as to the clinical findings and the etiology of the cases in question.

At the outset aniridia—as this is usually a congenital condition—must be excluded. Cases of aniridia have been reported, but this condition, both by means of the history of the case and physical findings, make the exclusion comparatively simple. According to Fuchs, atrophy of the iris may supervene as the result of various causes:

(1) Long continued or recurring inflammations.

(2) Increase of tension, involving the portion of the blood vessels at the root of the iris.

(3) In consequence of iridodialysis or traction.

(4) As the result of a too thorough

absorption, i. e. when swelling fragments of the lens lie upon the iris and are absorbed.

Appearances of the eyes of these patients present, of course, varying clinical pictures.

Case I.—This patient—Miss. R., aged 25, is a trained nurse. She suffered an attack of typhoid fever eight years ago and four years later had an inflammation of the right eye, which was diagnosed iritis. Up until the time of the iritis attack, both of her eyes had been normal. There is no history of trauma in this case. The inflammation in her right eye was a long, protracted affair, from which she never fully recovered. There were intervals of quiescence, then the eye would flare up again and become irritable. When we first saw this young lady, about Feb. 1st, 1918, the eye was quiet. Then tension of the eye was minus 3, i. e. it was quite soft. As a general thing, these reported cases of atrophy of the iris

have a complicating glaucoma and the tension of the eye is increased.

In this eye about one-half of the iris tissue had undergone atrophy. There

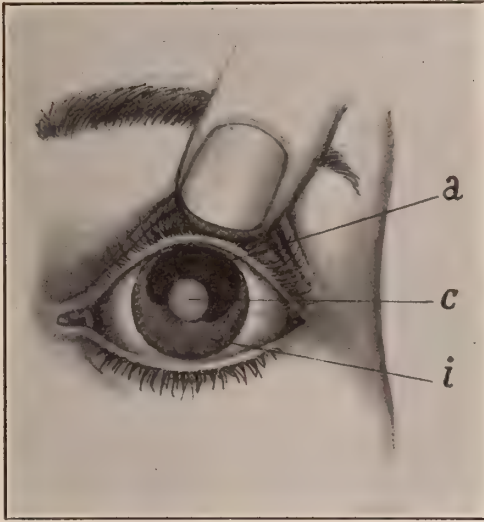


FIG. 1.

Atrophy of anterior layer of iris (a) Atrophic area. (c) Cataract. (i) Iris unchanged.

were no gaps in the iris so that no part of the iris stroma per se had wholly atrophied. A large central portion of the iris, above the pupil and as shown in the accompanying diagram, had atrophied. The normal color of this iris was blue, but the atrophied portion had changed to a brownish black. There was a complete annular synechia and the lens was cataractous and white. The anterior chamber of the eye was of normal depth and the cornea was clear. The treatment advised, and subsequently carried out in this case, was enucleation. The eye was stone blind and with the future uncertainty concerning sympathetic ophthalmia, the operation of enucleation was performed. The accompanying diagram,

Fig. 1, will show the clinical picture this eye presented.

Case II.—In the present instance there is a complete gap, or absence of iris tissue, at the point in the diagram marked *a. i.* In the report of the first case, it was stated that the atrophy of the iris had occurred with no loss of iris stroma. In this case there is absence of the iris stroma. One may look with an ophthalmoscope through the gap of the iris and obtain a good fundus reflex, although no details of the fundus are discernible. The etiology of this case is ophthalmia neonatorum; altho there has been no active inflammation in the eye since infancy and our patient, Miss L., is now twenty years of age. As the accompanying diagram of the eye will show, there is a large corneal opacity, C. O. A thin rim of iris, *i*, shows around the periphery.

Both of these drawings were made by the artist from the human eye.

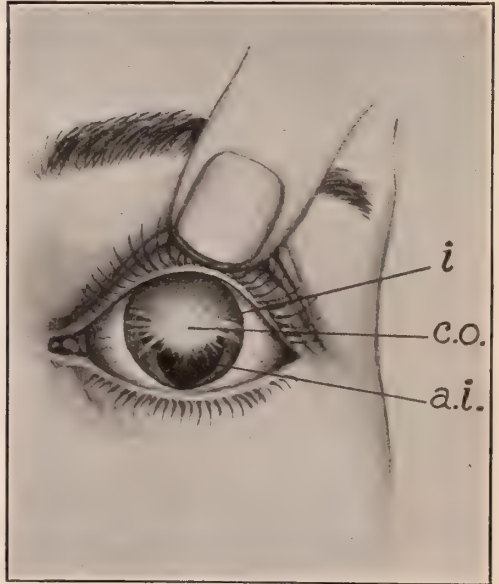


FIG. 2.

Atrophy of whole thickness of iris. (a.i) Space left by atrophy. (c.o) Corneal opacity. (i) Rim of iris seen at periphery.



## BLEPHAROSPASM SECONDARY TO PYORRHEA ALVEOLARIS.

H. M. THOMPSON, M. D., Pueblo, Colo.

H. G., a farmer of 52 years, bachelor, had enjoyed excellent health with the exception of so-called "rheumatic attacks." The eye disturbance began some weeks before the patient came to Pueblo. He apparently first noticed a conjunctival irritation. After a few days, the lids closed tightly in a tonic cramp, involving the whole of the orbicularis palpebrarum. The lids could be opened with difficulty under cocain anesthesia. The conjunctiva was inflamed, the cornea clear, the iris normal in color and the pupil greatly contracted. It was impossible at this time to examine the fundus of either eye with or without the pupils dilated.

A general examination of the patient was negative, so also was the urine. Dr. Maynard reported the Wassermann negative.

After four weeks of varied eliminative treatment with iodides, inunctions and profuse sweating, the latter given because of an admitted luetic possibility in younger years, the patient's suffering became more intense. The lids remained so tightly closed that there developed constant pain and some edema apparently caused by the fixed and intense muscular contraction.

The only visible possibility of an etiologic factor was the chronically inflamed and pus laden gums. A rather severe pyorrhea with loose teeth, suggested to me early the chance of a focal infection, but the patient refused to have the teeth extracted until the other treatment failed. Eventually, after four weeks of suffering, he agreed to see a dentist who removed all the teeth. The next day the patient was able to open his eyes and on the fourth day, he returned home with apparently normal ocular condition.

The fundi were "fluffy," but showed no discernible lesion and the conjunctival inflammation immediately cleared.

It appeared to me as a rare and interesting case, because of the long con-

tinued cramp of the orbicularis muscle secondary to a toxic inflammation of all the coats of the eye, due to a focal infection. The almost absolute proof of its focal origin would seem to be in the immediate cure after the removal of the teeth.

## HYSTERIC AMBLYOPIA.

FRANK A. MORRISON, M. D.

INDIANAPOLIS, IND.

Case 1.—Girl age 11 of rather a nervous disposition. Very ambitious at school where she had repeatedly led her class. No history of recent illness whatever, in fact, according to the mother, has always enjoyed exceptional health. For a week preceding her visit she had been studying closely for an examination, and had expressed a fear that she would be passed by another pupil.

She was successful in maintaining her class standing, but noticed the day before she came under my observation, that she was blind in the right eye.

At the first examination the admitted vision in the right eye was 20/80ths, but varied from time to time. Pupil slightly dilated, and contracted but slightly to light, both direct and consensual. Almost no accommodation reaction.

Field of vision could be taken only imperfectly, but showed concentric contraction for white. Colors too indefinite to warrant any conclusion.

Placed before the test type with a plane glass before the eyes (both remaining open) vision was 20/20ths. Suddenly removing the plane glass from before the left (good eye) and substituting a 10D. lens the vision in the right (or "blind") eye was 20/20ths.

Retinoscope showed under mydriatic .75D. of hyperopia in each eye. Examination repeated with this correction gave same result. Fundus normal. Diagnosis: Hysteric amblyopia following mental strain.

Case 2.—Boy age 12. The day pre-

ceding his visit he had been playing in the snow, and had come running into the house saying he had gone blind, and that a great black cloud was before both eyes. In a few minutes the left eye recovered, but the right remained blind. A physician was called but made no diagnosis.

At the time of his visit he was wearing a heavy bandage over the eye, complaining of pain when it was removed, but asserting he had no light perception. The pupil in the blind eye was somewhat dilated and its response to a light from a small electric lamp was questionable. No accommodative movement of the pupil.

Patient admitted no vision and asserted he could not tell when the light from the ophthalmoscope was thrown into the eye. Examined as in Case 1 vision in the blind eye was shown to be 20/20. Under mydriatic retinoscope showed only 0.25D. of hyperopia with a normal fundus. Diagnosis: malin-gering or hysteric amblyopia but probably the latter, as the boy expressed concern lest he would miss school. A possible explanation is, hysteric amblyopia due to fear of blindness resulting from persistence of after images.

## CORNEAL LOUPE.

ROBERT VON DER HEYDT, M. D.  
CHICAGO, ILL.

This loupe with self illuminating field was constructed as a help to ophthalmologists in examining the cornea, iris, anterior chamber, crystalline lens and capsule, and to aid in recognizing lesions of these structures.

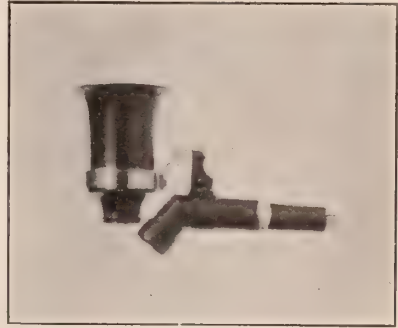


FIG. —.  
Von der Heydt's Corneal Loupe.

The lens in the instrument is of three-quarter inch focus, and is aplanatic. Attached thereto is a tubular angle piece, with small electric bulb and condensing lens, which well illuminates field in focus. The instrument was shown before the Chicago Ophthalmological Society, November, 1917.

## SOCIETY PROCEEDINGS.

### COLORADO OPHTHALMOLOGICAL SOCIETY.

January 19, 1918.

DR. MELVILLE BLACK, Presiding.

#### Unusual Cataract.

DR. E. T. BOYD presented a patient, aged 36, with lenticular opacities. In March, 1917, this patient consulted Dr. Boyd on account of headaches, so severe that he was unable to sleep for three weeks previous to this, and morphin had failed to relieve the pain. V. O. D. 20/20; V. O. S. fingers at 15 ft. He was given lenses to correct his vision and this

completely relieved the pain. In January, 1918, he returned with reduced vision. One lens is now opaque. The teeth, sinuses, and Wassermann are all negative.

DISCUSSION.—Dr. Edward Jackson said this man had lost his wife last August, is very nervous and in a run-down condition. He believes the cataract is due to the patient's poor general health, especially since he does not give a history of having had tetany, and has not used naphthalin in any form. He now has a patient who from 30 to 40 developed cataracts in each eye following tetany. She has had one operated, and the other may

require it. The urine is negative. There was a decided change from hyperopia to myopia, attributable to the swelling of the lens.

Dr. Melville Black suggested the use of subconjunctival injections of mercury, 1-5000, for deposits on the posterior lens capsule. This cannot do any harm and while it does not benefit senile cases, it may help Dr. Boyd's patient a great deal. He would also improve the general nutrition.

Dr. H. M. Thompson said this cataract case is unusual, rapidly progressive, and undoubtedly due to some undiscovered systemic change, evidenced by his loss of weight and general lowered vitality. He did not agree that local treatment might be used with any prospect of improvement. To treat an advanced case of this kind only brings discredit on the early treatment of cataract. The only cases amenable to treatment are those discovered early, where the opacity is just beginning and looks like dust particles suspended in the lens substance.

In the plethoric individual, intense eliminative treatment, sweat baths and regulation of the diet are advised; finding and removing any possible foci of infection and doing all those things which will be conducive to an improvement in the general well being of the patient. Every case demands individual therapy suitable to the physical condition. If cases are not properly selected in instituting treatment, the oculist will meet with much disappointment in this particular field, and will condemn the therapy that at times brings benefit to the patient.

#### **Uveitis with Punctate Keratitis.**

DR. BOYD presented a patient who had an operation for exophthalmic goitre at the Mayo Clinic one year ago. Three weeks ago he developed herpes zoster ophthalmicus, but had clear vision. He also gave a history of having had gonorrhea with arthritis of the knee. The accessory sinuses, the teeth, and Wassermann were negative. The anterior chamber is deep, and the uveitis is due to gonorrhea.

DISCUSSION.—Dr. D. H. Coover said he had had a similar case due to gonorrhea.

He took the tension and this was 70 mg. of mercury. He was perplexed at it being so high in iritis. He stopped the atropin and used eserine. The tension dropped to 35 mg. of mercury in a few days, however, the media were cloudy and he could not see the fundus. He considered this a typical case of gonorrheal iritis. Injections of vaccine were used several times and the patient fully recovered. He asked what the significance is of increased tension, and if it is high in all cases of iritis. He thinks the anterior chamber, being too deep, may possibly have been a factor. The pupil dilated very readily. There were no synechiae, until after eserine had been used. Atropin broke these up later, after the tension had been normal for some time.

Dr. W. H. Crisp said atropin will eventually lower the tension of these cases if we continue to use it.

Dr. Jackson said he has seen several cases of iritis with the tension between 50 and 60, and he believes that hypertension is common. Snellen tapped the anterior chamber in several cases and obtained germs in the cultures made from the aqueous.

Dr. Melville Black said in cases of gonorrheal iridocyclitis the vas deferens should be milked. This has been done with very great improvement.

#### **Corneal Abscess.**

DR. BOYD presented a case of corneal abscess. This began three or four weeks ago. There was first an ulcer, and this penetrated more deeply into the corneal lamellae, but there was no undermining of the edges. The eye improved for a few days under treatment, but the fourth day hypopyon developed. Cyanid of mercury was used subconjunctivally, with novocain, followed by wonderful improvement in one week. Later there was violent pain with increased tension and perforation during the night. This patient showed a deep stain about the margins of the ulcer, due to the silvol which was freely used.

#### **Iritis with Synechia.**

DR. BOYD also presented a case of iritis, with posterior synechia above and below. Atropin was used; cyanid of



mercury was injected subconjunctivally; and the adhesions were broken up by the next day.

### Fibroma of Orbit.

DR. D. H. COOVER presented Melvin J., age 11, operated last August, who was exhibited before this society by Dr. Stilwill for proptosis of O. S. in April, 1917. On account of the extreme proptosis, which was about 6 mm., he chose the external route. He resected the external rectus; loosened the orbital tissue; pulled the eye well forward and inward toward the nose, which gave him quite a cavity to explore. He passed his finger into the orbital cavity, and found a firm mass lying on the temporal side of the orbit. This mass occupied about one half of the orbital cavity and extended back to the optic foramen, and down to the floor. The upper border of the tumor could be distinctly felt, and there he made an incision thru the periosteum to the bone. With a small periosteal elevator he dissected the tumor from the side and floor of the orbit. In trying to remove it he found that it was adherent to the nerve and optic foramen. In dissecting it from its attachment, he severed the nerve and removed the eye with the tumor. The optic nerve was adherent to the tumor, but was not in the body of it as he had supposed. By a Kroenlein operation it might have been possible to save the eye. The tumor was kidney shaped, 35 mm. long by 25 mm. wide. Dr. W. C. Finnoff made the pathologic examination and reported it a fibroma.

### Scleritis.

DR. H. R. STILWILL presented a lady patient, who was first seen by Dr. G. L. Strader last August. The patient was under treatment, at that time, for a few days only. She had redness of the eye, but no pain. There was deep injection of the sclera recently. She had very bad teeth, and part of these were removed. Others have been removed more recently. Salicylates have been given freely and eliminative treatment used. V. 20/100 on December 1st, 1917, with hyperesthesia of the right side of the scalp. Dr. Stilwill said the teeth were X-rayed, when he first saw this case. Seven teeth had root abscesses and these were all re-

moved, but there has been no change in the eye since. The patient has received calomel, sweats, salicylates, etc.

DISCUSSION.—Dr. Crisp said he had seen several cases similar to this and he believed this one will improve later. He had a slow case of iritis improve three weeks after extraction of the teeth. No other etiology was found. He believed the absorption of toxins had not ceased in Dr. Stilwill's case.

Dr. C. E. Walker stated that if constitutional disease was present he would find this as well as examine the teeth and the gastro-intestinal tract. The patient should also be examined for lues and tuberculosis. He would call in a competent internist, as the laboratory examinations are very important.

Dr. G. F. Libby saw a child, this past fall, with scleritis. The father had been tuberculous. Such a child was predisposed to scleritis. An outdoor life, etc., cured this case entirely. He said if the root cavities were curretted, iodine used, and the cavities packed in Dr. Stilwill's case, there will be a slow recovery; as there was much poison in the system this must be eliminated before we can expect improvement in the eye.

Dr. J. A. McCaw referred to a woman, age 45, with severe scleritis last spring. The teeth were thoroughly cleaned and eliminative treatment was used. Aloes, iron and calomel were given with K. I. in increasing doses. She made a rather speedy recovery. She returned last fall, however, and was given K. I. again. She returned last week, for a third time, with a badly inflamed eye, showing that these cases are difficult to cure permanently.

Dr. E. E. McKeown said, cases with abscessed teeth should have a vaccine made from the cultures of the germs growing in the root abscesses.

Dr. Melville Black concurred with these remarks. He said if we extract the teeth it makes the eye worse for a few days, and the eye may not improve for a month, but this should not discourage us.

### Tuberculosis of Uvea.

DR. MELVILLE BLACK presented a patient, age 42, who came under his care a year ago. She complained then of slight

failure of V. O. S.; was conscious of the eye all the time and of a hot feeling in it. Upon going into a closet would see colors. These symptoms had been present for about ten days when first examined. Ophthalmoscopic examination showed the media were clear, the optic disc had a dirty appearance and the macula was a darkish spot, with no central reflex. V. O. D. was 20/15, and V. O. S. 20/20. The campimeter showed some enlargement of the blind spot.

Dr. Robert Levy had removed her tonsils and Dr. L. Freeman had removed gall stones, and the gall bladder in the summer of 1916. She was sent to Dr. Levy for a sinus examination. He had radiographs taken and reported the examination negative. She was sent to Dr. Hoffman for radiography of teeth. He found the lower left bicuspid was diseased. It was pulled. Wassermann negative. She went to her home in Nebraska and while there saw Dr. H. Gifford. Dr. Black has had no report from Dr. Gifford, but he was apparently puzzled. He also had radiographs taken of the head and teeth.

Dr. Black saw her again on the 4th of January. She had only L. P. in this eye, and it was inflamed and painful. The ophthalmoscope showed a vitreous obscuration. The reflex was good, but the cloud was impenetrable. With a +14 D. lens the anterior portion of the cloud was in focus and something like fine blood vessels could be seen, which seemed to have a vertical direction and came down from above. It presented the appearance sometimes seen in the early stages of the formation of a massive exudate, and he was inclined to think some such process was going on. The patient was given 1/7 mg. of old tuberculin, which caused a good deal of general malaise, but no elevation of temperature. The eye was more red and painful and the site of the injection indurated. There was no evidence of hyper- or hypothyroidism. She complained of a tenderness in the region of the appendix, but whether she has had a chronic inflammation there has not been determined. He stated that this patient received 1/20 mg. of tuberculin 5 days before the meeting. The eye has been better since and

there has been slight lacrimation, pain and redness. The posterior synechia below were found after using atropin.

DISCUSSION.—Dr. Jackson said he used transillumination recently, but this was not very satisfactory, nor was it very satisfactory in the better eye. He thought there was something back of the vitreous, as there was very yellow reflex. The whole picture made tuberculosis the most probable cause.

Dr. Walker said he had a case with old posterior synechia in the first eye. The second eye later became involved and reminded him very much of the inflamed eye in Dr. Black's patient. The Wassermann test was negative, but the tuberculin test was positive. This patient was being treated by an internist with tuberculin. With so much blocking of the canal of Schlemm he gives K. I. and mercury. The vision has improved to 20/30.

Dr. Thompson advised that the internist look carefully into the condition of the alimentary tract. The patient admitted having had pain in the region of the appendix. Other possible causes have been excluded, but the one great factor in many cases of chronic uveal tract diseases has been ignored. Elschnig classified these particular forms of eye diseases as having their etiologic factor in some disturbance of the intestinal tract; which interferes with proper intestinal digestion, thereby allowing bacterial toxins to enter the blood stream. Inasmuch as these chronic eye conditions, with subacute exacerbations, are mostly secondary, local treatment is of little avail unless the primary focus has been removed.

Dr. Thompson had reported in *Colorado Medicine* last September, a cure of most unusual case of this kind. The patient, a woman of 32 years, had suffered from recurrent, so called "rheumatic" attacks, at times affecting every joint in the body. She had experienced this condition since she was 9 years old. Eventually a vertebral polyarthritis left the thoracic column curved to almost an angle of 45 degrees. The vision was greatly decreased from the frequent attacks of iritis. Although this patient showed no definite abdominal symptoms, an explor-



atory abdominal operation revealed a chronically ulcerated appendix, with adhesions around the cecum. She made a prompt recovery; has not had a return of the iritis or the arthritis; and has since given birth to a healthy child.

### Steel in Orbit.

DR. F. R. SPENCER made a subsequent report upon the case of Master R. P., age 5, presented at the December 15th meeting, with a fragment of steel in the right orbit. Three days after the December meeting, the giant magnet was applied at the center of the cornea with the result that the steel was moved outward about 11 mm., but not forward. The lens haze and vitreous hemorrhage were unchanged January 19th. The X-ray plate showed the one position of the foreign body with the two extreme positions of the eyes. This tended to prove, as Dr. Jackson stated, that the foreign body was in the orbit. The movement or change of position when the magnet was used also confirmed this.

DISCUSSION.—Dr. W. C. Bane said he recently had a case of foreign body in the vitreous. The X-ray showed this was 15 mm. back of the cornea. There were no movement of the sideroscopic needle when used. An incision was made at the temporal side of the cornea and the tip of the hand magnet was passed into the vitreous chamber, but was unsuccessful both the first and second time. The third attempt removed the foreign body. The lens was cataractous, but the patient has light perception with good projection.

Dr. Crisp said, in speaking of the X-ray plate presented by Dr. Spencer, that it looked as if two heads were on the one plate. He thought the child must have moved his head between the two exposures.

Dr. Spencer said these two exposures on one plate made it look as if the head had been moved, but he was very positive the head had not been moved. The oblique exposure accounts for this.

Dr. McCaw said he had had a case with an inflamed eye. The roentgenologist located the steel back of the eye. Dr. Jackson saw this case in consultation and advised that the foreign body be let alone.

Dr. Walker said he had a similar case.

The X-ray showed the foreign body back of the eye. He advised to let it alone.

Dr. W. F. Matson said a patient of his was X-rayed for a .22 bullet. The bullet was shown in the orbit against the lacrimal bone, when he received the report from the roentgenologist. The eye was enucleated and the bullet found at the apex of the orbit.

Dr. C. A. Ringle said a case of his had a piece of plow share in the brain cavity, according to the X-ray. This patient was seen by Dr. Walker. However, it was removed with a good result.

Dr. Jackson said if this were his patient he would wait, as all things point to the location of the foreign body in the orbit.

### Iritis Due to Tooth Abscess.

DR. F. R. SPENCER presented B. F. C., age 43, first examined December 30th, 1917. O. S.: Cornea steamy, but not anesthetic; all media hazy; pupil 3 mm. immobile (atrop.); T. 8-11 mm. (Gradle tonometer); pain, photophobia, lacrimation, and marked pericorneal injection. V. O. D. was 6/6 and V. O. S. hand movements. Blood Wassermann 1+. X-ray of teeth by Dr. C. A. Monroe revealed one root abscess of left first upper bicuspid, and three impacted third molars. All were extracted by Dr. T. E. Carmody, December 31st. O. S. much better January 1, and has rapidly improved. Nose and throat examination negative. Dionin and atropin locally. Sweat baths. January 19, V. O. D. was 6/6 and V. O. S. 6/15-2. At the time of completing these minutes, March 2nd, 1918, V. O. U. 6/5.

DISCUSSION.—Dr. Crisp said one recent journal reported 55 cases in which a tooth abscess was responsible for the iritis, and the tooth was on the same side as the inflamed eye in 51 of these. He stated that dentists have determined streptococci to be present in many unfilled root canals; and that such teeth are dangerous, as they are likely to become active foci of infection at any time.

Dr. D. H. Coover said he had a keratitis case with five tooth abscesses. The cornea was very anesthetic, although it was not so since the eye had improved.



He also spoke of his personal experience with "gout," which was cured promptly and apparently permanently by the removal of a diseased tooth.

Dr. Melville Black said in cases of keratitis the teeth on the same side are very frequently involved. A patient with artificial teeth may have roots left in place, and we should be on the alert for this condition, especially as we can only detect these by means of X-rays.

Dr. Jackson had seen recently a case of herpes zoster ophthalmicus which was under the care of Dr. G. A. Moleen. The patient had some very bad teeth. He had herpes zoster last August, and after this there had been ptosis of one eye. The movements of the eye, however, were good. Vision had been reduced one-half by corneal haze. There was a tension of 55 mg. He said this etiology for herpes zoster ophthalmicus was rather new.

Dr. Walker said we do not hear of herpes zoster being repeated on the same side, and he doubted if there were any connection between the teeth and the attack of herpes. If there were, he believed these attacks would have been repeated.

Dr. Boyd said the first attack, in all probability conferred immunity.

Dr. D. G. Monaghan said he had one case in which the eye pain was due to impacted third molars.

Dr. D. A. Strickler reported a case of iritis in which there had been three recurrences. The teeth were X-rayed. Three upper right teeth were diseased and removed. O. D. was the only eye inflamed. The Wassermann was 4+.

### **Malingering.**

Dr. W. H. CRISP reported a case of malingering in a girl of 12, who had been in the juvenile court. The mother was a Christian Scientist. The eye looked negative. The child said she did not have any light perception. She did not blink when the eye was apparently to be struck by the hand, until the fingers touched the lashes. The pupil reacted normally to light. This child had been in a street quarrel a few days before with a neighbor's boy, and the boy had slapped her on the side of the face. However,

the eye was not struck. By tests for malingering she read 6/7.5.

**DISCUSSION.**—Dr. W. F. Matson saw the case early. The mother wouldn't permit drops to be used, to determine whether or not the child had been taught to malingering.

Dr. Walker saw the case, too. The mother wanted a certificate of blindness for the juvenile court, but the case was dismissed by Dr. Walker.

### **Abscess of Caruncle.**

Dr. W. H. CRISP reported a case of a young lady, 21, who had a mild conjunctivitis and later an abscess of the right caruncle. Four months later she had conjunctivitis of the left eye and an abscess of the left caruncle. Optochin was used for each eye. A free incision was made in each caruncle with a cataract knife and the typical furuncle core was removed.

### **Circumscribed Tuberculous Retino-choroiditis.**

Dr. H. M. THOMPSON reported the following: On January 16th, a 17 year old school girl, from a distant town, was brought in for examination because of a cloud before O. S. This condition was first noticed some five weeks previous while attending church. The patient, an only child, of an asthmatic father and healthy mother, was an active and bright girl who had been doing unusually well in school, and in addition attending many social obligations, without apparently any bad effect on her health. The parents considered the girl well, but not particularly strong.

A physical examination revealed no definite trouble. The urine and Wassermann were negative. The blood count showed 4,568,000 red corpuscles, 14,000 white cells and an increase in both lymphocytes, the mature being 18 and immature 20. The hemoglobin showed 100 with Sahli instrument. Von Pirquet's test was positive. On two occasions, a slight afternoon temperature was found. V. O. D. 20/15, V. O. S. 20/200. The field of the left eye showed a large scotoma on the nasal side.

A lesion of a bluish gray color, about

2½ times the size of the disc, the greater diameter being in the perpendicular, was seen extending from near the temporal side of the disc to the macular region. The margins could be definitely outlined. The inner half of the area showed a tendency to a gray white patch, merging into a slightly darker color as it approached the macula. Extending towards the latter, from the circumscribed edematous area, was seen a patch similar in form to a magnified Purkinje cell, with a red nucleus, the tail, as it were, extending into the macula. This central spot was probably a minute hemorrhage. The vessels ran to the edge of this lesion and promptly disappeared in the swollen retina. The whole area of involvement was free from vascularity and pigmentation. The fundus otherwise was not abnormal in appearance with the exception that the outlines of the disc were somewhat hazy."

The factors that occurred to Dr. Thompson, which are an aid to the diagnosis, include the general makeup of the patient. A young girl with clear skin, beautiful coloring, which readily changes, a precocious mind, nervous temperament and very ambitious, who is physically below par. There was a tendency to afternoon temperature; the blood showed an increase of lymphocytes; and the von Pirquet was slightly positive. The lesion in the eye was independent of any change in the rest of the fundus. The absence of pigment, the color, edema and the apparently beginning atrophy of the choroid, added to the above, make up a picture that apparently can only be classified as of tuberculous origin.

FRANK R. SPENCER,  
Secretary.

## CHICAGO OPHTHALMOLOGICAL SOCIETY.

February 18, 1918.

President, DR. HEMAN H. BROWN.

### Some Remarks Concerning the Smith-Indian Intracapsular Operation for Cataract.

DR. FRANK ALLPORT read a paper on

this subject in which he stated that the most important phase of the cataract subject before ophthalmologists at the present time is what is popularly known as the Smith-Indian operation, as performed by Major Smith and modified by many surgeons of less experience. This procedure consists in the removal of the lens in its capsule after the method proposed by Major Smith, and when successful, produces brilliant and ideal results.

The only question for American ophthalmologists to decide is, whether this operation is the best one to perform. He would not attempt to speak for others, but personally he does not feel justified in adopting this operation in his own practice. If he could get the average percentage of good results by safer methods for his patients, who come to him for vision, and not for experimental surgery, it is his duty to give them the best that is in him, and he was sure this would not be the case if he began doing the Smith operation. He is perfectly willing to acknowledge that Major Smith and a few other East Indian operators of enormous experience, who do many of these operations daily, can do them successfully and achieve a large majority of brilliant results. He concedes this, although he contends that statistical results of all these operations might not be as convincing as the intracapsular operators desire. These poor blind people make cataract pilgrimages to the Smith shrine, are operated, and then return as quickly as possible to their distant native hills and are never seen or heard from again, thus rendering the collection of accurate ultimate statistics impossible. For this reason, we may never know what all the end results are of this much extolled surgical procedure. Smith's patients in India were tractable, patient, obedient people, unpoisoned by stimulants and excessive and rich food. Quick healing and slight reaction should be the rule under these circumstances. Should Smith, however, come to America, he would be confronted by an entirely different class of patients. He would operate on a large number of unmanageable,

impatient, nervous, disobedient, opinionated people, accustomed to servility from others, whose bodies have grown fat, flabby and diseased by laziness, gluttony, drink, autointoxication, syphilis and so on, and with whom slow healing and considerable reaction might be reasonably expected. If this is true, then those operators of less experience than Smith will surely get even poorer results than he would. On account of his natural skill and immense and unprecedented experience, Smith has acquired a skill and dexterity unequaled by any living man. He could do things no one else could do; he could meet emergencies better than any cataract operator in the world.

The greatest good to the greatest number should be the motto of all cataract operators, and the speaker is sure that this result cannot be attained in this country by using the Smith-Indian operation. Some intracapsular operation may be, and he believes will be devised, that will be suitable for average operators, but the Smith-Indian operation is not the one. Some claim that this operation is not so difficult after all, but the speaker is confident that only a few over zealous disciples entertain such optimistic views. The fact is, it is a complicated, difficult and dangerous surgical procedure, except in the hands of a few men like Smith and other East Indian surgeons, and even their hands might lose their cunning unless they were kept in constant practice.

The author believes that men in this country, who only operate a few cases a year, should not unnecessarily risk vision and the happiness of those patients who confide themselves to their care, because they, for one reason or another, are determined to risk the Smith-Indian procedure. The speaker thinks, therefore, rather than attempt this brilliant procedure, which he believes should only be used under favorable circumstances by exceptionally expert and experienced surgeons, that we might be better occupied in perfecting the quite satisfactory operation with which we are already familiar, and in reaching out along more con-

servative lines for the future intracapsular operation.

DISCUSSION.—Dr. Willis O. Nance expressed the belief that the Smith-Indian operation would never become the popular operation for cataract. The operation requires a special training and a special technic, that comparatively few ophthalmologists can ever attain. It has always seemed to him to be a much more difficult operation than the old von Graefe procedure. The speaker felt that pressure exerted on the eyeball, as is necessary in the Indian operation, was an element that should be avoided as much as possible in the ideal cataract operation. The Smith incision is not safe as is the old operation, in which the incision is carried beyond the limbus with a conjunctival flap. He could not see how the incision, made well into the cornea, could help but be responsible for the creation of astigmatism, although he has seen some published reports to the effect that astigmatism is no greater in the new operation than in the old. The incision, in his opinion, must necessarily be more liable to infection than the limbus incision.

The dressing advised by Smith has never met with Dr. Nance's approval. He has never been able to bring himself to the belief that the bandaging of the eye, upon which an operation has been done, should be left ten days without an inspection of the eye.

The technic of the Smith operation is a more or less delicate one, and must be learned carefully and practiced many times, if good results are to be obtained.

There is of course an advantage in operating in some cases of immature cataract, but the speaker, personally, would prefer to wait until the lens had become opaque.

Dr. Nance prefers to adhere to the capsulotomy operation rather than to adopt the Smith-Indian procedure. If he had the opportunity to do one hundred or more of these operations, at the hands of Smith, he might feel entirely different about it, but few surgeons receive that training, and until we do precaution and safety would naturally in-



dicating the employment of the older method.

Dr. G. Henry Mundt stated that he understood the essayist to say that in satisfactory cases the intracapsular cataract operation was probably better than the old capsulotomy operation. This the speaker granted. Dr. Allport, however, has placed the proposition in a way to show that the intracapsular cataract operation could not be done satisfactorily by the average operator, with which he did not agree.

Referring to the average operator, the speaker saw no reason why the average operator, unless he was thoroughly satisfied with the operative procedure that he was doing, could not develop intracapsular cataract technic as well as he could develop capsulotomy technic.

As to the amount of pressure necessary to produce collapse of the globe, if the operation was done properly sufficient pressure would not be exerted to produce collapse of the globe. If the lids were properly held, he did not believe the proportion of extruded vitreous would be as great with the intracapsular cataract operation as it would be with the old capsulotomy. If a man once mastered the technic of the intracapsular cataract operation he would be satisfied with it.

As to the proportion of astigmatism in the corneal incision, he did not believe it was any greater from the intracapsular cataract operation than it was from capsulotomy.

With reference to the length of time to leave the bandage on, this was a detail which he believed was a good one. The trend of surgery today was to leave bandages on longer than was done a few years ago.

Finally, the intracapsular cataract operation was no more experimental surgery to the average operator than was the capsulotomy operation.

Dr. H. W. Woodruff showed a case in which a cataract operation had been performed in both eyes. In itself there was nothing especially remarkable; but in connection with Dr. Allport's paper it served to demonstrate an important point. One eye was operated

on for cataract by simple extraction five weeks ago, and the other eye had the intracapsular operation performed on it three weeks ago. The visual results were the same in each eye at this time—20/30 with lens correction. The reason the intracapsular operation was performed on the second eye was because the lens was hypermature; the capsule refused to be cut, and the lens came out in the capsule. Iridectomy was done because the lens would not readily come through the pupil without that operation. In other words, it was an operation of necessity, while the first one was an operation of choice. The point to be emphasized is that there is no single method which should always be performed in every case of cataract.

He believes that the intracapsular operation may be one of necessity, while the simple extracapsular operation should be in selected cases the one of choice. He thought ophthalmologists made a mistake in attempting to prove that one method is the proper method in all cases of cataract. He believed that ophthalmologists had learned a great deal from the exploitation of the Smith operation. There had been times when he thought he should do that operation, but as he was so much more familiar with the ordinary operation he had confined himself very largely to it, and furthermore, it was so difficult to change one's technic that he had so far, excepting in very few cases, not gone over to this operation. In a person of middle life, say fifty years of age, in a physician, who was unfortunate enough to develop cataracts, one of them mature and the other one still immature, so that he was still able to attend to his routine work and was in perfect physical condition except for these cataracts, he would consider it a shame to cut out a piece of that man's iris, unless it was absolutely necessary. The visual results might be perfect (20/20) following the intracapsular operation, but when such a person went out into the sunlight he would have difficulty in recognizing objects quickly. He would not have the quick acute vision that

the man would who had a perfectly good pupil. He had noticed this about cataract patients, that while their vision may be 20/20 when tested, still it took them some time to quickly recognize objects. When one operated on a brother medical man in active practice he felt that that man was entitled to absolutely the best that one could possibly give him, and personally he knew he would appreciate very much retaining the sphincter muscle of the iris. So unless it was absolutely necessary, he would not do such an operation on such an eye which would involve the cutting of the iris. However, if he knew that the lens was hypermature, then the intracapsular operation was the better operation because there would be difficulty in removing the lens from the capsule.

Something had been said in the discussion about the use of retractors in holding the lids. This was one thing about the Smith operation that the speaker did not like. He would admit it was probably only a personal objection on his part and perhaps of not great value; nevertheless, it had always seemed to him as if the assistant holding the lids was in the way, and when he got ready to operate he felt like brushing them all aside and getting at the eye alone. He felt that he did not want any one else to touch the eye or to touch the lid. He felt absolutely safe in the average case if he had good anesthesia. It was so long since he had seen the loss of vitreous in an otherwise normal eye by the patient squeezing his lids that he did not feel at all afraid of that, if he knew his anesthetic was working properly. He had gotten so, that in many cases he used a 10% solution of cocaine, and in the case he had shown tonight there was absolutely no movement of the patient in either operation. The capsule was still present in the left eye, but it was only capsule. There was no lens substance in there, so that nothing was to be feared from the needling operation. This was the only reason why the Smith operation was ever done, namely, to do away with the capsule

as well as the lens. The needling was not serious at all unless one had a great deal of cortical substance and one only had that in the immature cataracts. That was another time when the Smith operation or the intracapsular operation was worth while considering.

Dr. Clarence Loeb stated that in conversation with one of the foremost advocates of the Smith operation, he had been told that one great advantage of this operation over the old style operation was in being able to get a clear pupil. Although he had operated on over 200 cases of cataract by the old method, he did not feel justified in saying that this method would always produce a clear pupil. However, he, himself, had had less than two per cent of secondary cataract. By making an incision well below the pupillary margin, and away to one side, drawing it all the way across parallel to the inferior margin of the lens, and bringing it back across the face of the cataract, attempting to joint the two incisions if possible, subsequently keeping the pupil dilated with atropin, at the end of four to six weeks the capsule was almost invariably retracted upward and filled out the coloboma, and by so doing he was enabled to get a clear pupil without the Smith operation. He had done the Smith operation in four cases and did so without ever having seen a cataract operation of that character done by the man who has been performing it, but simply from what he had read about it. In the first two operations the result was perfect. The result of the second operation was very good, and the third operation resulted in the loss of the eye from a low grade iridocyclitis. The lower margin of the pupil was always drawn well up beyond the center of the cornea, so that the process of light entering the eye was undoubtedly interfered with. For that reason he went back to the old method of von Graefe for the extraction of the cataract. He did not believe that the Smith operation was any more difficult than was the von Graefe.

Following his first operation the next day he noticed the surroundings of the



eye of the patient, so far as he could tell beyond the limits of the bandage, were swollen, and in taking off the bandage to see the condition of the eye he found enormous swelling; both the lids were so swollen that it was impossible for the patient to open the eye. He had to open it by means of a retractor. He expected nothing else than a beginning or far advanced panophthalmitis, but to his surprise, beyond a fair degree of injection of the ocular conjunctiva, there was nothing to be seen. This edema in the course of three or four days disappeared entirely.

He would like to know if any member ever had such an intense edema following a cataract operation without any cause for it.

Dr. Oliver Tydings stated that if the remarks on this subject were confined alone to the Smith operation, he would not have any dispute with the essayist or the gentlemen who have discussed the paper. But if the technic could be extended, as it had been developed at the Chicago Eye, Ear, Nose and Throat College, he would say that it was infinitely safer and it was possible to do the old operation with that technic. Before the introduction of the Smith operation he had long since eliminated the speculum, regarding it as a dangerous weapon. He contended that the technic of the Smith operation was the easiest and safest and best, and if a man was going to continue to do the old operation, he should learn it if only for the purpose of using it when he got into trouble. With a lid retractor the operator was safe. However, one could take a nurse and train her to retract lids. The services of an expert for this purpose were not required. If one once mastered the Smith technic, he would never abandon it.

Dr. William A. Fisher said he was glad to know that the Smith operation was being discussed. The essayist and some of the men who had discussed the paper acknowledged that they had not had enough experience in the intracapsular operation to speak with authority. The speaker did not think that any one should undertake to re-

move a lens in capsule if he did not understand the technic. One could get experience in the Smith technic without going to India, because it was not so much experience that one should have in a cataract operation as it was that he should have experience in the complications that often occur during a cataract operation by any method.

The speaker exhibited an eye of a six weeks' old kitten in which the cornea was eleven millimeters in diameter, stating that the cornea was thin, like the human, and one, if ambitious, could get these eyes by the hundred. If the operator believed it would take a hundred operations to understand and master the technic, he could get that number, or two hundred, if necessary. He could practice the spoon and needle delivery, which should be mastered before the operation was attempted at all. Tension in this eye was the same as in the human eye.

He thought that if Col. Smith was present he would have felt flattered at the wonderful opinion the essayist expressed of his operation, and that he believed Smith was the only man that could do it right, but ninety per cent of the lenses extracted in northern India are extracted in the capsule and they were not extracted by oculists who occupied chairs in a university, but by general surgeons whom Smith had taught. He did not believe Col. Smith would expect everybody to agree with him, and the speaker said he certainly would not expect everybody to agree with him, but he believed there would be a different feeling regarding the Smith operation if the men would pay more attention to the technic and less to criticism of it.

The essayist stated that it was his opinion that operators in the U. S. A. who were removing lenses in capsule would not care to have their results published, but he surely knows that there are reliable intracapsular statistics which could be readily obtained, with a comparison of other methods.

The speaker then presented the following intracapsular statistics regarding vitreous loss:



	No. of operations.	Vitreous loss.
Smith, 1904....	2,616	6.76%
A. Knapp, 1908	104	11.5%
Vail, 1912.....	358	2.2%
Clark, 1912....	245	4%
Meding, 1912..	325	10%
Shepard, 1912..	650	5.2%
Smith, 1913....	150	2%
Fisher, 1914....	576	7%
Total .....	5,022	6.37

#### VISUAL RESULTS FROM CAPSULOTOMY METHOD.

H. Knapp, 1,000 cases, 20/40 or better, 52%.

Duncan, 100 cases, 20/40 or better, 69%.

Webster, 100 cases, 20/40 or better, 57%.

Weeks, 100 cases, 20/40 or better, 7.8 or 54.5%.

#### INTRACAPSULAR RESULTS.

A. Knapp, 100 consecutive cases 20/40 or better, 70%.

D. W. Greene, 203 consecutive cases, 20/40 or better, 72%.

A. S. Greene, 109 consecutive cases, 20/40 or better, 86.2%.

Fisher, 94 consecutive cases, 20/40 or better, 74%.

Meding, 83 consecutive cases, 20/40 or better, 73%.

Total, 589 consecutive cases.

Vision 20/40 or better, capsulotomy method, 54%.

Vision 20/40 or better, intracapsular method, 73%.

Dr. Fisher exhibited at the Chicago Ophthalmological Society, January, 1915, 12 cases. There were ten patients with average vision of 20/25; no losses. Smith in 1912 reported 132 selected cases operated by him personally with vision of 20/40 and better 100%. Gidney reported 100 patients, both eyes operated, one eye intracapsular, and the other capsulotomy.

Intracapsular cases, 100 20/40 or better, 54%.

Capsulotomy, 100, 20/40 or better, 18%.

From the above statistics it would seem that ophthalmic surgeons who are operating by the intracapsular

method cannot be expected to abandon it and return to the capsulotomy method just because some operators who are unfamiliar with the technic choose to condemn it.

Dr. Allport, in closing, stated that he firmly adhered to what he had said, in spite of the remarks of Dr. Fisher and others concerning the ease with which the Smith-Indian operation can be performed. He cannot agree with these gentlemen that it is safer than the operations usually performed in this country. He believes it to be a much more difficult and hazardous procedure than the ordinary operation, and one that should only be indulged in by those of superior surgical skill, special clinical education and an extensive cataract practice. He would like to ask Dr. Fisher and others why they felt it necessary to travel to India for instruction if this operation is so simple? He still contends that this procedure is not adapted to the average American operator, with an average cataract practice.

#### ANGIOMA OF THE ORBIT.

DR. GEORGE W. BOOT reported the following case: I saw this girl first about the middle of December. She is a German, 21 years of age, and single. She gave no history of accident or previous illness. She first noticed trouble with her eye about eight or nine months ago, at which time it was bloodshot and somewhat swollen. This condition has gradually grown worse. As you see, she has a soft swelling at the inner part of the orbit; the upper eyelid is swollen; there are large tortuous vessels crossing it, and the trouble has distinctly increased since I saw her in December, when I felt a swelling, and noticed a thrill with it and in listening with the stethoscope I heard a bruit over the whole face. There are no lesions inside the nose. I thought possibly this growth might extend into the nose, but the nose is normal. I had stereoscopic X-ray pictures taken, but there was no sign of erosion of the bone.

The question of diagnosis came up, and I believe this is a hemangioma. I find that hemangiomas are mentioned

in practically all textbooks, and ordinarily they are classified under three different forms, the capillary nevus or the so-called port wine marks, cavernous angioma, and plexiform angioma. Fuchs says angioma of the orbit is rare, but Axenfeld says it is not so rare. I have looked over the Index Medicus for the last five or six years and have only found five cases recorded, so that the condition probably is quite rare.

Angioma is very apt to be mixed with other forms of tumor, such as angiosarcoma, or myxangioma, or fibroangioma, or angiofibroma, depending upon the kind of tissue the tumor is made up of.

The symptoms as given for this condition are usually, first, exophthalmos. The patient notices that the eye is more prominent than usual. In this case exophthalmos is well developed. This condition lasts for a considerable length of time ordinarily, and then swelling is noticed outside of the eyeball. In this case it is seen alongside of the nose. This swelling is apt to be somewhat bluish in color, soft, not painful, and it can be made to disappear by pressure, but returns again when pressure is removed. Norris and Oliver say that these angiomas are not accompanied by bruit or thrill. Ball says they are usually accompanied by bruit or thrill. This case is accompanied by bruit.

Roemer mentions varicose veins of the orbit, but the cause of the varicose veins is not given.

The capillary form of angioma is congenital, or it appears shortly after birth. The cavernous form and plexiform form of the trouble develop later in life. Varicose veins develop still later. In some forms the angiomas are encapsulated.

As to treatment advocated, when the growth is encapsulated excision by means of the knife is perhaps the best method. Most authors apparently would recommend electrolysis for angioma.

In the American Encyclopedia of Ophthalmology I find a report of one case in which a man used absolute alcohol for angioma through the con-

junctival surface of the lid. He injected three drops, then later six drops, and repeated six drops on two other occasions, with the result that the angioma completely disappeared. In this patient I had contemplated the use of electrolysis, but the growth has increased since I saw her last and it extends out to the side of the nose and over to the other side of the face, so that I doubt whether electrolysis would be advisable in this case.

Among the dangers connected with this trouble are septic thrombophlebitis, and that is particularly apt to follow electrolysis. I would be afraid to use electrolysis in this case on account of the possibility of embolism. I am in doubt as to what should be done. Ligation of the carotid would probably help, but in the few cases I have been able to get track of where that has been done, the results have not been permanent because of the collateral circulation which is established.

If any of the members have had an experience of this sort I should like to hear it.

DISCUSSION.—DR. OSCAR DODD saw this case when Dr. Boot presented it at the Evanston Branch of the Chicago Medical Society in December. There was quite a change in the appearance of the condition since that time, there being considerable extension of the swelling above the nose at the inner angle of the orbit; also enlargement of the veins at the outer margin of the orbit, but the proptosis was no more than at that time. At present the bruit was much more marked and pulsation could be felt all about the orbit as it could not be at the time he first saw the patient.

The diagnosis in this case was rather difficult. He thought it was an angioma when he first saw the case in December. However, he questioned this diagnosis tonight for the reason of the greater distention of the veins and the distinct pulsation which was present. By pressure over the carotid the pulsation and distention of the veins was markedly lessened and one could see the recession of the eye. It looked to him as though there was a probable connection between the artery and the

vein, and that this was a typical pulsating exophthalmus. In contradistinction to this we might have an angioma with distension to which the pulsation was communicated from the artery.

As to treatment, the ligation of the carotid was the first thing that should be done in this case. He did not know whether that would be sufficient to cure or not, but it would at least relieve the pressure and make it safer for further operation should such be necessary. Unless something was done, it looked as though the case would go to disastrous results.

DR. OLIVER TYDINGS stated that while he had never seen a case of the kind described, yet in connection with it he would like to relate a case that he observed many years ago. In that case one could hear a bruit across the room. There was no external appearance at all. He had the late Dr. Francis T. Miles, neurologist, and professor of anatomy at that time in the University of Maryland, see the case, and he put it down as a tubercular condition of the meninges that produced the bruit and cautioned him very carefully to have a postmortem made. But the patient would not die; he could not get the postmortem. The last time he saw the man was ten years ago and he understood he was still living and well. The case was exceedingly interesting, in that the patient got well without any trouble and without any treatment. If he were going to do anything in an operative way on the case Dr. Boot had reported, he would either use hot water or something that he had seen mentioned lately, namely, the use of quinin and urea for the purpose of producing obliteration of the aneurysmal varix.

DR. BOOT, in closing the discussion, said that he had neglected to say in his previous remarks that there were no particular changes in the fundus. The veins were somewhat engorged, but this was about all. He had considered the possibility of arteriovenous aneurysm, but the absence for any cause of such aneurysm led him to think that it could hardly be that.

## PROCEEDINGS OF THE SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA—JOINT MEETING WITH SECTION ON OTO-LARYNGOLOGY.

December 7, 1917.

DR. S. LEWIS ZIEGLER, Acting Chairman.

### Intracranial Complications of Aural Diseases in Relation to Ophthalmology.

DR. S. MACCUEEN SMITH said that ocular manifestations are frequently unreliable on account of their absence in most rapidly progressing cases, sufficient time for their development not elapsing between the onset of the disease and its fatal termination. Optic neuritis, while a fairly constant symptom, is mainly due to intracranial pressure, and therefore not characteristic, necessarily, of aural diseases and their complications alone, but may also be found in brain tumor, etc.

Ocular symptoms would seem to offer definite indications that the aural disease has involved tissues within the cranial walls, this being about the limit of their significance. The absence of ocular symptoms, on the other hand, does not exclude the presence of intracranial suppuration. Given other characteristic symptoms, a negative ophthalmoscopic examination has absolutely no significance. Optic neuritis in sinus thrombosis occurs too late to be of early diagnostic value, but will be present in about 50 per cent of the more advanced cases.

In brain abscess there are no intra-ocular symptoms that define its location. Symptoms which indicate the presence of this lesion, but not its location, are photophobia, external strabismus due to pressure on the motor oculi, or nystagmus and dilated pupils if the abscess is large; while if small, the pupils are small and sluggish. This being true, neuritis occurs late when pressure is exerted thru abscess in the temporo-sphenoidal lobe, but is earlier in development and more constant in abscess of the cerebellum.



In temporosphenoidal abscess of the left side, aphasia is present, as well as optic amnesia and optic neuritis if the abscess is sufficiently large to produce pressure. In cerebellar abscess, nystagmus is common and optic neuritis is more constant than in temporosphenoidal abscess. Nystagmus will usually be found directed toward the affected side, becoming more marked as the disease progresses.

Cerebral irritation is a prominent symptom during the initial stage of meningitis; also photophobia and contraction of pupils. Later, as compression symptoms develop, the pupils react sluggishly and finally become dilated, often unequal, and may be firmly fixed. At this late stage symptoms of cerebral paralysis become increasingly marked, together with ptosis, strabismus, nystagmus or conjugate deviation. Diplopia has been such a constant and marked symptom in the writer's personal experience that he looks upon it as being of considerable importance, and he is always suspicious of a developing meningitis when a patient suffering from aural disease complains of a progressive intolerance to light.

**DISCUSSION.**—Dr. Howard F. Hansell said: Diseases of the eyes in their relation to diseases of the ear as a subject of study had received scant attention until the importance of the tests for balance or equilibrium became manifest. The status developed by the Bárány test, both physiologic and pathologic, of the relation between the ear and the eye is striking and impressive. Without indicating disease of either organ in the subject of the test it demonstrates the presence or absence of a lesion of the connecting fibers or the cortex of the brain, its location and its approximate size—a long step forward in the diagnosis of intracranial affections.

Papillitis and muscular paralysis are the usual ocular complications of otitic meningitis, the former due to involvement of the sheath of the optic nerve, and secondarily the nerve itself, by direct extension of the inflammation and the latter to pressure by the products

of the inflammation on the sixth, fourth and third nerve, in the order given, in their course at the base or at the entrance into the orbit.

A second class of cases of ocular involvement include those in which a clot or thrombus originating in otitic inflammation lodges in the lateral or cavernous sinus. The optic disk is covered by exudation and hemorrhages. The retinal veins are enormously dilated and tortuous and the retina infiltrated by numerous deep and superficial hemorrhages. Diseases of the ear and temporal bone are responsible for two-thirds of the cases by reason of direct contact, by meningitis and by brain tuberculosis.

Another set of cases are those in which labyrinthine disease is the cause of some forms of nystagmus exclusive of nystagmus of miners or of opacities in the media. Bárány has clearly shown that physiologic nystagmus is created by a current in the horizontal canals. His tests have led to the knowledge that diseases of the labyrinth, or of that part of the brain connecting the labyrinth with the nuclei of the external eye muscles, becomes the cause for the nystagmus.

That diseases of the eye may produce organic changes in the ear leading to deafness has not been established. The only indication that such a connection may possibly exist is the deafness associated with sympathetic ophthalmia. It has been suggested that this reflex movement has its origin from unusual impulses arising from the labyrinth.

Transmission of disease from the ear to the eye is always serious and often fatal because of the complex channel of communication. It is never direct or immediate as is the case in extension of disease from the sinuses adjacent to the orbit. The germ or exciting cause travels through veins or lymph canals, through the membranes or tissues of the brain and seldom through continuity of structure. Therefore, ocular complications may be referred to cerebral rather than to otitic causes.

#### **Ocular Signs and Symptoms Associated with Intranasal Lesions.**

DR. S. LEWIS ZIEGLER stated that

only within recent years had the inter-relations of ocular and nasal lesions been accepted as important factors in the evolution of modern medicine. He considered it important that the rhinologist and ophthalmologist should join hands in a coöperative effort to recognize and correct these obscure lesions. The transmission of disease may occur thru direct infection, thru the toxins of suppuration, thru continuity of tissue, thru edema from pressure in the orbit and thru lymphoneuroses which are purely reflex.

Dr. Ziegler reviewed in some detail the affections of the orbit, ocular pareses, optic nerve lesions, intraocular manifestations, lacrimonasal disease, headache and reflex neuroses which arise from intranasal and accessory sinus disease. The reflex neuroses arising from intranasal lesions were of special interest to the writer and he thought the three most active etiologic factors were: (1) Pressure contact, (2) hyperesthesia and (3) nasal obstruction.

Dr. Ziegler thought that the most interesting part of this whole problem was the study of these reflex manifestations and concluded by asking, "Why should intranasal pressure originate a severe bulbar or supraorbital neuralgia? Why should sinus disease cause a fugitive edema and ecchymosis of the upper lid as in a case related by de Schweinitz? Why should boggy contact pressure in the nose of an undernourished child cause blepharospasm, photophobia, corneal ulcer, scalp sweating and universal skin leakage? Or in such a case why can we reverse the reflex by opening the child's eyes, and thus cause it to sneeze? Why does a nonsuppurative nasal lesion cause choroiditis, as improvement through nasal treatment has demonstrated? Or why, as in Dunn's case, does a chronic choroiditis recover when a shrunken fibroid appendix is removed? In other words, will not a careful study of the chemistry of metabolism show us how a terminal sympathetic filament controls a local lymph secretion, whether it be pathologic from a normal reflex or pathologic from a perverted reflex. Would we not therefore gain much

profitable information by a closer study of lymphoneuroses originated by reflex impulses?"

### Ocular Lesions the Result of Oral and Pharyngeal Diseases.

This paper by Dr. William Zentmayer has been published in full, page 247.

DISCUSSION.—Dr. Charles P. Grayson thought that Dr. Zentmayer had displayed a great deal of both discrimination and industry in the preparation of his paper. The field that he covered is one of comparatively recent opening, yet he has combed the literature so critically and thoroughly that his paper is one of exceptional clinical interest. It seems to Dr. Grayson still questionable whether any pathologic condition within the mouth or nasopharynx can exert a direct disturbing influence upon the eye. None of course, doubt that the focal infections so frequently traced to the teeth and tonsils can occasion such serious systemic disorder that the eyes may share in the general disturbance, but this is obviously indirect and is not at all analogous to an ocular injury that ensues, for instance, upon disease of the nasal accessory sinuses. If the eyes suffer at all from the general bacteremia occasioned by alveolar abscesses or cryptic suppuration of the tonsils, it is probably in most cases a late manifestation and has been preceded by a number of other lesions that have already directed attention to the source of trouble. If there be any direct pathologic connection between the mouth and oropharynx and the eye, it certainly has not yet been clearly demonstrated and Dr. Grayson is inclined to doubt that it will be.

### Obstructive Lacrimonasal Disease and Its Treatment.

DR. E. B. GLEASON stated that the infection of the duct may occur either from the conjunctiva or the nasal mucous membrane and the reason why this does not happen more frequently is due to the small size of the puncta and the presence of the valve of Hasner. The nasal orifice of the duct is in



the suture of the inferior turbinate with the superior maxillary at the junction of the anterior fourth with the posterior three-fourths of the turbinate at the apex of a broad inverted V, the line of suture descending somewhat abruptly in front and more nearly horizontally behind; so that the valve of Hasner is easily located by passing a probe from behind forward beneath the inferior turbinate until the end of the probe sinks into the apex of the V described above. In the same way a tube may be inserted into the duct so as to cleanse it by injecting fluid from below through the duct, sac and puncta. The nasal orifice of the duct can be inspected in most instances by infracting the inferior turbinate with Sullivan's modification of Killian's speculum. This procedure is usually done to expose the nasal wall of the antrum so that a sufficient portion can be curetted away under direct vision to thoroly open the antrum. The procedure can be repeated at ordinary office visits as often as thought necessary without great reaction as far as the inferior turbinate is concerned.

The most annoying symptom in mild cases of catarrh of the duct is epiphora. Generally the obstruction to the flow of tears is either where the inferior canaliculus enters the sac or at the nasal orifice of the duct. If the obstruction is at the canaliculus, the treatment is astringent collyria, dilation or slitting open the canaliculus. When the obstruction is at the nasal orifice, the treatment is intranasal. Cases where epiphora occurs only when the patient is exposed to cold, yield to applications beneath the inferior turbinate body to the region about the nasal orifice of the duct of iodine—potassium iodide—glycerin or 10 per cent argyrol. Because of the close proximity of the wall of the nose and middle turbinate, there is sometimes a capillary attraction that retains the solutions in contact with the parts for a considerable time. Treatment should be directed when necessary to reducing the size of the inferior turbinate with scissors, snare or galvanocautery or changing its relation

to the nasal wall by infracting it toward the septum.

The more severe cases of infection of the sac with retention of pus with or without a fistula are not very satisfactory to treat. However, the majority of oculists seem to think that better results are obtained by passing probes, wearing styles, etc., than by intranasal operations. In one case seen by the writer ten or more years ago where there was complete bony occlusion of the nasal orifice of the duct and a fistula, he laid the fistula open into the sac and introduced a small nasal trephine into the sac as low down as possible and removed a small disk of tissue into the nose. He then turned into the nose through the opening a thin strip of skin from the lower lid and stitched up the wound. The operation was simple and easy and was reported a year or more afterward as having been successful in bringing about a cure of the fistula and relieving the epiphora.

Purulent dacryocystitis may progress to bony occlusion of the duct with fistula beneath the inner canthus. The conjunctiva may be infected from the pus, and ulcers form on the cornea; but although theoretically a suppurating sac is a focus of infection comparable to chronic alveolar abscess, suppurating tonsils, etc., the deeper structures of the eye are probably never infected from this source except through a wound.

DISCUSSION.—Dr. Posey said that the cause of a watery eye is not always intranasal, for it may depend upon a number of factors connected with the eye. Thus, increase in lacrimation is symptomatic of nearly all inflammatory conditions of the eye. Again, certain conformation of the skull which occasion abnormally small lacrimosal ducts predispose to it. Anything which interferes with the delicate suction-like action by which the tears are sucked up from the globe and conveyed into the lacrimonasal sac is also a causal factor. Certain innervational disturbances in the supply of the orbicular muscle and relaxation of the internal palpebral ligament, will occasion this.



Dr. Posey said his plan of procedure in the treatment of diseases of the excretory portion of the lacrimal apparatus is as follows: If there is simply increased lacrimation without any apparent local cause to occasion it, the punctum is dilated and the sac and duct washed out with a solution of boracic acid, zinc or alum. Stronger astringents are never used, on account of the danger of their escaping into the soft tissues of the orbit and causing orbital cellulitis. Dr. Posey referred to a case seen in the practice of another where vision was lost from orbital cellulitis occasioned by the escape of a solution of silver nitrate into the orbit during the act of syringing; inflammation of the optic nerve followed by atrophy resulting. If repeated syringing fails, he then introduces a style, as he does not think the repeated passage of probes is warranted, on account of the pain which this procedure gives rise to and the doubtful results. Care must be taken that the operator should conform the length of the style to the apparent length of the duct before operation, and the right-angled shank should be made to fit nicely into the divided canaliculus, to prevent subsequent healing and closure of this tubule and to provide for drainage. The style is removed at the end of three or four months. If lacrimation still persists, the extirpation of the sac is advised.

For Acute Dacryocystitis.—After the administration of a general anesthetic, gas in many instances, the lower canaliculus is emptied by pressure on the swollen lid, and a style inserted after the manner just described. This one operation gives exit to the pus, overcomes the stricture and provides drainage at the same time, and is much to be preferred to the old method of incising the sac from without and later overcoming the stricture by probing. He had operated on all his cases of acute dacryocystitis in adults by this plan for many years, and never had one untoward result.

For Lacrimal Stricture with Catarrhal Discharge.—Syringing with astringent washes and the instillation of a 1 or 2 per cent solution of ethylhydro-

cuprein into the conjunctival cul-de-sac several times daily was his usual procedure. The administration of the latter solution is in most cases purely empirical, and he had found it highly efficacious in many cases of catarrh of the sac in which pneumococci are not found. Failure after two or three weeks of this treatment is followed by extirpation of the sac.

Mucocele of the sac, with tightly enclosed contents. Extirpation of the sac is advised in all cases.

The indications for the removal of the sac have been given. The method employed was that outlined by Meller, and the success of the operation depends upon a strict adherence to his technic. The first essential is the control of pain and bleeding by a free use of novocain and adrenalin, nine parts of a 2 per cent solution of the former to one part of a 1 to 2,000 solution of the latter. The Pravaz syringe recommended by Meller is clumsy and provided with too large a needle. The ordinary hypodermic needle suffices. The contents of one barrel are emptied just under the skin, one half below and the other half above the canthal ligament. The contents of the second barrel are injected into the deeper tissues above and below the ligament. Care should be exercised to avoid injuring the walls of the sac with the needle.

After incising the superficial tissues, and parting the lips of the wound with Meller's speculum, the sharp teeth of which are replaced by dull ones, to avoid possible injury to the cornea in case of slipping, he searched carefully for the internal palpebral ligament, as the most valuable landmark in the operation. The ligament once found, the position of the sac just below it is readily ascertained, and it becomes a simple matter to divide the ligament and to separate the inner wall of the sac from the bony margin of the orbit by the points of a closed pair of scissors. More difficult is the separation of the outer wall of the sac, on account of the danger of getting into the orbital fat and obscuring the field of operation. After freeing the lateral portions of the sac, the sac is pulled forward by a stout

pair of forceps and the duct divided as far down in the canal as possible. The division of the apex of the sac is left until the last, as the few rapid cuts of the scissors necessary to accomplish this are often followed by considerable hemorrhage. After curetting the lacrimonasal duct, the lower canaliculus invariably should be slit up and curetted throughout its entire length, to destroy its mucous lining, and to obviate leaving any possible focus of infection. Healing is prompt, and in but one case, where a keloid overgrowth marred the cosmetic result, had there been any appreciable scarring. He had done the operation a great many times and found it one of the most satisfactory in eye surgery.

Dr. S. D. Risley said he had been deeply interested and instructed by the thoughtful papers presented in the symposium provided by the Committee. His own experience was quite in accord with most of the views which had been expressed both in the papers and the discussion; but he thought that additional emphasis should be given to two features, bearing, primarily, (1) upon the etiology of the group of affections under discussion and (2) upon their treatment. He thought that the importance of anatomic deformities in the anterior segment of the skull was often overlooked. Many years ago he had observed that frequent association of ocular defects with these variations in the form of the skull and had secured a large collection of hatters' forms for patients with high degrees of asymmetric astigmatism, and with muscular imbalance and had been impressed by the often grotesque shape of the head in these cases. Not only was the cranial dome distorted but there was great deviation in the face. A relatively flat or even concave zygoma on one side and a large convex one on the opposite side, and the eye on one side being nearer the median line of the face than on the other.

It is obvious that these deviations would affect the walls of the orbits and cause more or less variation in the location of the eye in the orbit and the form of the eyeballs and also of the

distribution of the extraocular muscles; not only in their origin at the apex but in their length, line of direction and their point of attachment to the eyeballs. He thought that these abnormal conditions were in a large measure responsible for the defects of refraction in the eye, thru a change in the diameters of the face, and also for many of the abnormalities of binocular balance. He had been impressed by their frequent association.

But not only were the orbits involved in these anatomic anomalies, but also the nasal fossae and the mucous-lined bony sinuses contiguous to the orbits, and the lacrimal duct, all of which drain into the nose and pharynx. Any change from their normal relations, is significant not alone for the reason that it may disturb their normal drainage, but renders them peculiarly liable to disturbance from any systemic disease affecting the mucous membranes. This was a second point which he wished to emphasize. The mucous membrane lining all these cavities in the anterior segment of the skull, the conjunctiva with its lacrimal drainage system, and the ear with its Eustachian tube should be included, are particularly susceptible to many systemic disorders. The ectoderm, he thought, seemed the first to disclose the presence of toxic, or infectious systemic states. A good illustration, he thought, was found in the so-called common cold, with the stuffed nose and ears, increased lacrimation, frontal pain and general malaise. The conjunctiva remained transparent but was edematous and the ophthalmoscope revealed a hazy fluffy fundus. The same conditions were often found after attacks of acute indigestion, or with prolonged or habitual constipation, as a result of the ensuing toxic conditions. There was probably present in all of these systemic conditions a general acidosis of the tissues; certainly professional experience had for many years approved the administrations of the alkaline earths as a therapeutic measure. He had so frequently seen this toxic syndrome clear up under alkaline treatment and attention to the alimentary



tract that he esteemed such measures as important before any radical operative interference was undertaken.

Dr. Holloway stated that he was very glad to hear Dr. Zentmayer make the statement he did in regard to dental infection. While he had no doubt these were all too frequently responsible for ocular conditions, we should not lose sight of the other etiologic factors in the present vogue for focal infections. Some years ago we went thru the cycle of accessory sinuses, then the ductless glands, and we are now in the cycle of dental infections. The fact that many of these symptoms or diseases that have been enumerated may be caused by a dozen different factors should lead to an exhaustive study of the patient. Not infrequently two or more affections have been found and the difficulty is to determine which is really the exciting cause.

Concerning the dacryocystitis cases, Dr. Holloway stated that he had very good results in using mercuraphen as an irrigating fluid. Mercuraphen is the new mercurial preparation made at the Dermatological Research Laboratories of the Polyclinic Hospital by Drs. Schamberg, Kolmer and Raiziss. The first case in which Dr. Holloway had had occasion to use this the dacryocystitis was associated with mature cataract. Pure pneumococcus cultures were recovered from the conjunctiva, but after slitting up the duct, free irrigation of the eyes and irrigation of the sac and duct with mercuraphen, negative cultures were obtained at the end of a week. He had also obtained splendid results with this preparation in the treatment of acute conjunctivitis.

J. MILTON GRISCOM, M. D.  
Clerk.

## WILLS HOSPITAL OPHTHALMIC SOCIETY.

Meeting of February 5, 1918.

### Infection After Cataract Operations.

DR. P. N. K. SCHWENK reported two cases of panophthalmitis with recovery following cataract extraction. The

first case, a woman, age 72, underwent a combined lens extraction at her home, on November 21st, 1917. The patient made an uneventful recovery, but there remained an opaque piece of capsule in the pupillary area. About a month later, a capsulotomy was performed, followed in twenty-four hours by severe pain, nausea, and edema of the bulbar and tarsal conjunctiva. The cornea was indurated at site of limbal puncture. Two days later, the anterior chamber was two-thirds full of a purulent exudation and the cornea was steamy. A 25 per cent solution of argyrol was instilled three times a day, atropin four times a day, and the eye was frequently cleansed with boric solution. Externally, to the lids, a warm 50 per cent solution of magnesium sulphate was applied for fifteen minutes every two hours, for six weeks. Internally, 2 grs. quinin were administered four times daily. At the end of three weeks, the corneal induration began to subside and the hypopyon had nearly disappeared. At the end of the sixth week, the sclera was white and the cornea clear except for a minute scar at the site of former puncture. Today there remains some organized lymph in one portion of the pupillary area, but the corrected vision is 6/30. Dr. Schwenk said that he had never seen, in his experience, such a violent inflammation followed by retention of the normal shape of the globe.

The second case, a woman, age 82, underwent a combined lens extraction on November 16th, 1917. Two days later the wound was healing nicely, the anterior chamber had reformed, and there was but slight reaction. Four days later, the aqueous was hazy, there was a small hypopyon, and more pronounced reaction. The case was then treated in a similar manner to the one above mentioned. Nine days the aqueous was clearing up. The pupillary coloboma space was filled with a whitish exudate. Ten days later, this exudate was absorbing. Eleven days later, the eye was entirely quiet and a capsulotomy was done. The following week, numerous vitreous exudates and



a faint fundus reflex was seen. Two weeks later, corrected vision was 6/30 and the patient was discharged.

**DISCUSSION.**—Dr. Zentmayer thought that the cases reported by Dr. Schwenk should not be classed as panophthalmitis, but rather as wound infection with iridocyclitis. Personally he had no faith in argyrol in these conditions and lately, in two cases of wound infection, he had used subconjunctival (intraorbital) injections of cyanid of mercury (1-3000); and had attributed the very satisfactory end result to this method of treatment. Possibly less radical methods would have proved as effective.

Dr. McCluney Radcliffe presented a case of panophthalmitis following cataract extraction, caused by tooth infection. He had performed a combined operation and recovery proceeded in a normal manner until the seventh day, when symptoms of infection were first noticed. (Before the operation was undertaken, a negative smear had been made from the contents of the conjunctival cul-de-sac.) With the onset of symptoms of infection, the usual treatment was instituted without effect. It was finally discovered that there was an infected tooth on the same side. An X-ray was taken and showed a diseased root. The tooth was then extracted. There was a large cavity in the lower portion of the crown and the root showed necrotic changes, but there was no abscess. The eye now shows a condition of phthisis bulbi and will have to be enucleated. Dr. Radcliffe thought that the onset of the disease seven days after the operation, when the anterior chamber was thoroughly closed, strongly indicated that the infection was of endogenous origin.

**DISCUSSION.**—Dr. Zentmayer said that he did not recall in literature a case of panophthalmitis attributed to focal infection. Most of the cases were uveitis. There were however several cases, similar to the one reported by Dr. Radcliffe, in which infection following operation had been attributed to oral sepsis.

Dr. Posey thought Dr. Radcliffe's conjecture regarding the origin of the

infection was correct. He thought, however, that ocular infection from dental causes was exaggerated. He had recently been compelled to operate upon a case with marked pyorrhea and had never had better results.

### Corneal Opacity.

DR. POSEY reported a case of corneal haze in a miner. The haze, which was limited to the pupillary areas of both eyes, consisted of a grayish-white stippling of the anterior layers of the cornea, apparently due to a hyaline change. The remaining portions of the cornea were clear; vision equalled 5/15 in each eye. The patient was a laborer and had worked for 30 years at the openings of shafts, where he was subjected to violent drafts. The ocular changes here seen were probably caused by the action of air laden with small irritating particles of dust. Dr. Posey referred to an article written by Nettleship some years ago, in which that author referred to a number of cases of dimness of vision resulting from a haze of the corneal epithelium, occasioned by a high wind. He said that he had recently seen a similar case in his own practice in which a break in the epithelium, caused by the lodgement of a foreign body, was surrounded by a peculiar haze of the epithelium which was elevated as though infiltrated with oil droplets. This condition of affairs subsided in twelve hours.

**DISCUSSION.**—Dr. Zentmayer asked Dr. Posey how he explained the limitation of the opacity to the center of the cornea. In most similar conditions the opacity was zonular.

Dr. Schwenk considered that Dr. Posey's conclusion, that the corneal irritation was caused by wind laden with foreign matter, was quite reasonable.

### Perforating Wound of Globe.

DR. POSEY showed a child who had suffered a perforating wound of the limbus. The iris had been prolapsed and the lens injured. As the case did not report at the hospital until 48 hours after the injury had occurred, he treated the case expectantly, especially

as there was some discharge from the conjunctiva. He thought it a mistake in cases of this kind to open up the wound after it had been once partially closed over with epithelium, on account of the danger of wound infection. As in this case, he preferred to wait until the inflammatory reaction and the conjunctival irritation had subsided. In this case he closed the wound by dissecting the conjunctiva from the ectatic area, and slipping the same underneath the undermined conjunctiva below the wound, just as is done in the McReynold pterygium operation. Such a procedure closes the wound, makes tension upon it and produces a flat scar.

### Adenoma of Orbit.

DR. POSEY exhibited a case of a young girl, from whom he had recently removed an adenoma of the orbit. The cosmetic results were almost perfect, a slight drooping of the lower lid and a very fine scar over the outer marginal rim remaining. But three weeks had elapsed since the operation.

DISCUSSION.—Dr. Zentmayer said that he thought Dr. Posey had more than cured the exophthalmos, and that there was now a slight enophthalmus. The result, however, he considered to be excellent.

HAROLD W. HOW, M. D.,  
Secretary.

## BLUE CATARACT.

Y. KOYANAGI.

OSAKA, JAPAN.

Abstract of translation from the Nippon Ganki Zasshi, March, 1917, by N. Kunitomo, M. D., Denver, Colorado.

Opacity of the crystalline lens seen by oblique illumination commonly shows a grayish white color. By direct illumination with the ophthalmoscope, it appears dark against the red background of the pupil, the extent and form of the shadow depending on the amount and distribution of the opacity.

In certain cases, however, by oblique illumination a blue or greenish color is shown. The condition causing this appearance is known as "blue cataract" (*cataracta coerulea*), and in this condition ophthalmoscopic examination may show no interruption of the fundus reflex. The parts of the lens thus affected may take the form of a star or Y-shaped figure. More frequently they appear as dots in the periphery of the pupil, or only discoverable when the pupil has been dilated. These dots may be arranged in radiating lines or sectors, though such grouping is often not very evident.

The various possible causes of such coloring have been reviewed by Isakowitz<sup>1</sup>. He rejects the explanation that

it might be due to contrast with a yellowish or brownish background. (The plate representing a case seen by Römer<sup>2</sup> shows a strikingly blue iris.) The explanation by a selective transmission of light is also unsatisfactory, because under direct illumination, the dots of affected tissue do not seem to interfere with the transmission of any of the rays. A fluoroscopic effect changing the color of the light falling on such tissue is not probable, and experiment with a 9 per cent solution of quinin bisulphat confirms the rejection of this hypothesis.

The observation of Professor Rayleigh, applied to this form of cataract by Hess,<sup>3</sup> is accepted as indicating the true explanation for this appearance. Lord Rayleigh found that in an opalescent medium containing innumerable fine particles of a different refractive index, the dispersion of light is inversely proportioned to the fourth power of its wave length. Hence the parts of the crystalline lens presenting such irregularities of refractive index



BLUE CATARACT  
KOYANAGI'S SECOND CASE





caused the dispersion chiefly of short wave light, green, blue and purple. By such diffuse light, they are rendered visible, blending into blue the color of such spots as seen by daylight, or green as seen by yellow artificial light.

It is of practical importance that this form of partial cataract generally appears early in life, interferes comparatively little with vision, progresses very slowly; and is capable of extraction without iridectomy and without much liability to leave cortex in the capsule.

Koyanagi's three cases studied at the Red Cross Hospital at Osaka, were as follows:

Case I.—A man, aged 21 years, first examined November 19th, 1913. He gave a history of good vision and no trouble with his eyes until four months previously. Then he noticed blurring of vision. There was no difficulty with accommodation, or failure of the reactions of the pupil; and his eyes were free from pain. Corrected vision was: R. 6/8. L. 6/8, the lenses required being 1.75 D. and 2. D. cylinders, respectively. The position and movements of the eyeball, the conjunctiva, cornea and iris were all normal, the diameter of the pupils, 3.5 mm. When examined by oblique illumination, there were seen within the crystalline lens near the edge of the pupil a number of small dots of cloudiness of a greenish color. Examined by direct ophthalmoscopic illumination, these dots caused no shadow. On dilating the pupil, a larger number of such dots were exposed, many of them of an oval or broadly linear form, arranged as radiating from the center of the pupil. But the extreme periphery of the pupil was free from them. Examination of the urine showed neither sugar nor albumin. The eyes were carefully watched for two months, but showed no change.

Case II.—A man, aged 29 years, first seen October 30th, 1913, complained of

blurring of his vision for the last three years, which had improved under treatment, but later became permanent. Each eye had corrected vision of 6/8. On examination both eyes were found alike. There was slight clouding of the cornea, but no blood vessels. There had been no pain, and over the nebula was a depression of the surface. On dilating the pupil, the right eye showed the appearance reproduced in Plate IX. The left eye also showed a Y-shaped blue clouding at the center of the pupil. These spots were easily seen by oblique illumination, but by direct illumination could not be discovered, even by the use of a strong convex lens. The intra-ocular tension was normal, the urine free from sugar or albumin.

Case III.—Man, aged 45 years, was first examined February 9th, 1915. He came for blurring of vision and excessive lacrimation, which had been diagnosed as acute conjunctivitis and in a few days disappeared under treatment. Vision: R. 6/4. L. 6/8. On examination in the dark room, there was found in the anterior portion of the crystalline lens behind the center of the pupil a Y-shaped cloud of greenish color; but by careful examination with direct illumination, nothing could be found. He was examined again in October, when there had been no change in the left eye; and the right eye was still found free from any appearance of opacity. This patient gave a history of an injury to one eye in childhood, but could not remember which eye it was.

(Koyanagi's cases call attention to a condition which has been rather neglected in the literature of ophthalmology, and which is almost unmentioned in the American literature. It is a condition that is certain to be overlooked unless the eye is carefully examined by oblique illumination, and generally with a fairly dilated pupil.—Ed.)

#### BIBLIOGRAPHY.

1. Isakowitz. Lichtzerstörung in trüben Medien der menschlichen Linse. Zeits. f. Augenh. Bd. xix, p. 401, 1908.
2. Römer. Lehrbuch der Augenheilkunde. Amer. Transl. v. 1, p. 213.
3. Hess. Pathologie u. Therapie des Linsensystems. Handb. d. ges. Augenh. v. v. Gräfe-Saemisch Bd. vi., Abt. II, 1905.

# THE COLOR SENSE

(Om farvesans.)

BIRGER MALLING.

TROMSOE, NORWAY.

Abstract translation of a contribution from the University Physiologic Institute, from the Norsk Magazin for Laegevidenskaben, January, 1918, p. 1, by William H. Crisp, M. D. This reports an analytic study of twenty-five cases of slight anomalies of color perception.

The first color-blind patient was described in 1777, and in 1794 Dalton gave a thoro description of himself as color-blind. The study of color-blindness acquired real practical significance when Holmgren demonstrated that a railroad accident at Lagerlunda, Sweden, in 1875 was caused by a color-blind engine driver.

The classic grouping of defects of color vision is based upon Helmholtz's observation that mixture of the spectrum's three colors red, green and blue in various proportions is capable of giving a color impression corresponding to any given color of the spectrum, as these colors appear to the normal individual.

By means of the Rayleigh equation the relation between red and green components in trichromatic subjects (those capable of perceiving all three of the principal colors) has been studied; and it was shown that in a number of apparently normal trichromatics there were distinct variations from the normal in two directions, in that one group needed more of the red component to produce equality, while another group needed more green, that is to say the first group must be regarded as less irritable toward red, the other for green. Inasmuch as the individuals belonging to these two groups require the three usual components in order to see the various colors of the spectrum, but in a proportion differing from that of normal trichromatics, these individuals have been designated as protanomalous or deuteranomalous, according to whether they belong to the first or second group. This classification corresponds to the division of dichromatics, or individuals seeing only two component colors, into protanopes, whose so-called "warm" component's maximum

lies nearer the green, and deuteranopes, whose "warm" maximum lies nearer the red. The protanomalous and deuteranomalous cases represent a transition toward the protanopes and deuteranopes.

The normal trichromatic sees the spectrum as a series of colors shading into one another from the extreme red to the extreme violet. Dichromatics, on the other hand, see the spectrum quite differently: protanopes and deuteranopes see merely two different-colored parts, a "warm" long-waved part, the conception of which approaches yellow, and a "cold" short-waved part, the conception of which approaches blue: these two parts are separated in the green by a so-called neutral region where no color is recognized. Protanopes further show a very characteristic relation in that the spectrum is shortened in the warm part, so that the conception of color and light out in the red part stops sooner than in normal individuals. Tritanopes see a marked shortening in the blue part. Monochromatics see the whole spectrum as one color—colorless—with a maximum intensity in the green, and show a shortening of the spectrum both in the red and in the violet part.

The object of Malling's study was originally to investigate anomalous cases more closely, in order if possible to show more clearly how far they were to be regarded as color-blind or not. Just as with the Rayleigh equation one obtains an expression of the irritability toward green in relation to red, so Malling wished to clear up the comparison between other parts of the spectrum, so as to obtain a more complete picture of the variations in color perception from individual to individual. For this purpose he studied twenty-five cases, eight women and seventeen men, most



of whom were medical students and two graduate physicians; first by means of five "equations" between different parts of the spectrum, second as to the length of the spectrum both in the red and in the violet part, and third as to the "neutral" region.

Malling used for his experiments a modified Helmholtz color mixture apparatus which he describes in some detail. A detailed account of the individual investigations and their results in each subject is also given.

Malling's experiments indicate that there are greater and lesser departures from the normal in a large proportion of the cases examined, and these variations are not only in degree, but also in the nature of the disturbance. The suggestion is made that sooner or later it may be possible to demonstrate transitions from the normal through all forms of color-blindness in an unbroken series to complete color-blindness.

Tables corresponding to variations in perception of the same color from individual to individual show a steady diminution in the perception of nine spectral colors, reaching from the normal to the completely color-blind. The result must be regarded as applicable to every color of the spectrum. The slighter disturbances are as a rule isolated; the severer ones are more frequently present simultaneously at several parts of the spectrum.

The frequency of the various abnormalities is indicated by the following figures: Out of twenty-five cases, there was a reduction in color sense for red of wave length 660 in four cases, for red of wave length 658 in thirteen cases, for orange 600 in five cases, for yellow 576 in one case, for green 524 in five cases, for blue-green 502 in twelve cases, for blue 480 in five cases, for blue-violet 458 in one case, for violet 445 in one case. Out of nine cases there was a reduction for yellow 576 in three cases, for blue 458 in six cases.

There thus appear to be two relatively weak points, one about 658 and one about 502, with diminishing weakness toward both sides. The greatest weakness is at 502 and upward, where

the neutral spot usually appears. Thus the most frequent disturbances are in the red and in the green, in agreement with the relation found in practice, defects in these regions being so common that in using the word color-blind, for practical purposes, one thinks only of red-green blindness.

The numbers also throw an excellent light on the manner in which the red-green blind person's perception of the spectrum arises. In the green toward the blue-green the trouble is worse, and here we have the neutral spot, where the perception of color is entirely absent. From here the trouble has spread in both directions. Toward the blue it is soon arrested, so that as a rule the color-blind person can recognize the difference between blue and violet as two colors. But the relation is otherwise toward the red end, in that here the neighboring green section is markedly affected, the yellow is well recognized, but further along the red section is disturbed. Hence arises the difficulty in distinguishing the different colors in the long-waved portion of the spectrum: since the yellow is most definitely perceived, it happens naturally that the neighboring colors are confused with and approach yellow in their perception, and this part of the spectrum is seen as yellow.

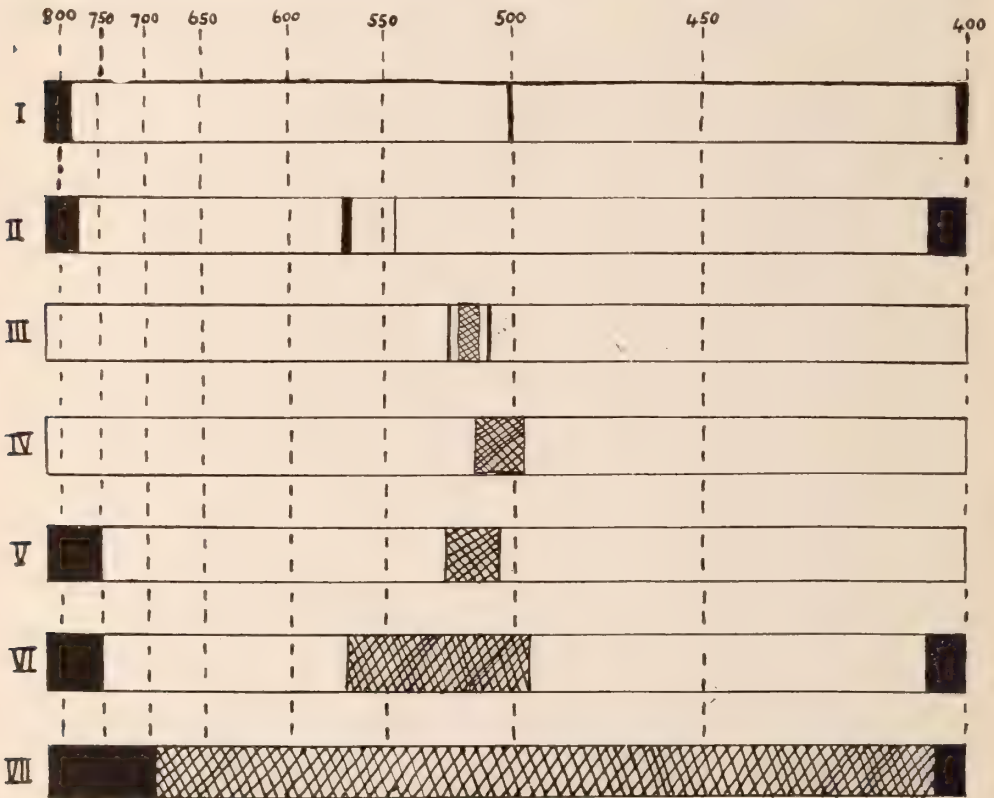
In six of the subjects examined a neutral spot was found. This was far from being the same spot in all subjects, but varied distinctly both in position and extent. It also varied in intensity, in that in some subjects there could be traced a slight indication of color, what Malling calls an incomplete neutral spot, in distinction from the complete where the normal color is merely seen as gray. These areas are always seen by the normal person as possessing an intense color.

Chart I in the illustration shows a quite small incomplete or almost complete neutral spot at 500. Chart II shows two narrow incomplete neutral spots at 542 and 566, of which the latter is most pronounced and is almost complete. Chart III shows a somewhat broad complete neutral spot between 508 and 512: at the immediate bound-

aries of this spot color is recognized, but beyond these boundaries again there appears a narrow, incomplete neutral spot at 506 and one at 515: beyond these two color perception rapidly increases. Chart IV shows a broad, complete neutral spot from 508 to 498. Chart V shows a complete neutral spot from 517 to 503. Chart VII is the spectrum of a completely color-blind person, and may be considered as a single neutral spot. There is nothing to prevent our imagining all the neutral spots shown in figures I to V as occurring in the same person and

turbances of similar nature with the neutral spot.

It is thus seen that the neutral spot may occur incomplete or complete, may be singular or plural in number, and may vary in location and extent. The pseudo-monochromatic must certainly be regarded as an intermediate step between Chart VI and Chart VII since he is characterized by being able to recognize colors only in the outer parts of the spectrum, and this only to so slight an extent that he may give the impression of being monochromatic.



Charts showing neutral zones in the spectrum in cases of anomalous color perception. (Malling)  
Roman numerals on the left indicate numbers of the charts as referred to in the text. Arabic figures at top indicate wave-lengths in different portions of spectrum.

also extending to the intermediate parts of the spectrum. The neutral spot which would thus be formed is indicated in Chart VI. The figures also show shortenings of the spectrum, which must merely be regarded as dis-

The so-called anomalous cases are to be regarded as cases of color disturbance with defect chiefly in the red or in the green, but without either of these colors losing its specific color. Whether these cases shall be called

a type or not is merely a question of words. They are a frequently occurring departure from the normal, with all transitions on the one side to the normal, on the other to the completely red-green blind; so that the boundaries of the group will always be variable. If the anomalous person's defect in red or green goes so far that one of these lacks its specific color impression, one has the case described as extreme anomalous, and characterized by being able to establish an equation between green and yellow or red and yellow, but never both equations at the same time. If the defect goes still further so that in addition to the green (or red) the red (or green) part of the spectrum also loses its specific color, the power to distinguish the colors of the long-waved portion of the spectrum will be completely lost and one has the completely red-green blind.

Malling traces through a series of illustrative cases the stepwise departure from the normal toward the pathologic. One case, a definite anomalous with defect principally in the green, although still retaining specific green perception of inferior quality, is compared with

another case showing a similar defect in the red. In a third case, green perception is extremely reduced and this case approaches the so-called extreme anomalous, in that it can form an equation between a yellow and a green which are not too widely separated from one another in the spectrum (582 and 540). A fourth case lacks specific green and red perception, is a typical red-green blind, and can form an equation between all colors in the long-waved part of the spectrum. This group is of great practical importance in daily life, and the moderate degrees of this color disturbance present material difficulties in the determination of the problem whether they are practically competent as to color or not. For example cases unsuitable for purposes of navigation may succeed in passing the ordinary color tests; while on the other hand the various anomaloscopes, while furnishing information as to even small departures from the normal in green and red perception, do not necessarily indicate the proper boundary line between those who may and those who may not be properly employed in special services.

## TOTAL ACHROMATOPSIA.

OTTO WERNICKE, M. D.

BUENOS AIRES.

Abstract translation from the Boletín de la Sociedad de Oftalmología de Buenos Aires, Año IV, p. 159, by M. Uribe-Troncoso, M. D. This reports the cases of two brothers, and gives a general review of the subject.

Altho partial blindness for colors is of common occurrence, total achromatopsia is very rare. The number of cases reported has increased recently since we have learned to suspect the condition by other and more noticeable symptoms than the color tests.

Achromatopes learn to distinguish colors and even to name them by their respective differences in brightness, by the presence or absence of reflexes on

the surface, by the form of the objects and by habit. But for them the world is only an engraving with shades of gray and white. They generally go to the oculist to be relieved of three important symptoms, viz., low visual acuity, photophobia and nystagmus.

Visual acuity generally varies from 1/10 to 1/5; rarely reaches 1/3. Only one case is reported in the literature (Raehlmann) in which acuity of vision



was normal. Low vision is due in some cases to corneal scars, atrophy of the optic nerve, macular choroiditis, albinism, etc., but in the majority of cases there is no organic lesion which may account for it. The amblyopia is almost constant, and not a mere coincidence as has been suggested. This may give some clue for ascertaining the cause of the anomaly.

Photophobia is correlated to this symptom, nystagmus. When the former is severe the latter is very marked and vice-versa. With the photophobia the forehead is wrinkled, eyebrows contracted, palpebral aperture very narrow, and head flexed. Dread of light increases with the intensity of illumination and decreases at night.

Luminous sense is normal in achromatopes. The nystagmus is rarely wanting, but it is not as constant as the amblyopia, and in some cases ceases with advancing age. It generally increases on fixation, and is probably due to another very important symptom, central scotoma.

Roenne was the first to detect central scotoma, which has been found in nearly half of the patients. But it is necessary to have always in mind that its detection is very difficult, and sometimes impossible. Uthoff did not find it in one of his patients at first; but was able a year later to plot it with the ring-shaped fixation test.

According to Grünert, even in cases in which central scotoma could not be detected, an anomaly of the macula, or of the macular fibres, certainly existed. This is the only way to explain how, with very low central vision, the limits of the visual field and peripheral vision in general were normal.

Achromatopes see the color red, and those near it in the spectrum, as a dark spot, and violet and nearby colors brighter than with the normal eye. Red is mistaken for black. Yellow-green is the brightest. The limits of the spectrum are either the same as normal or a shortening of the red end or of both ends may be present. The best method for detecting achromatopsia is Holmgren's test. The Hering disk and the spectroscope are also useful.

Dr. Wernicke's patients were two brothers 18 and 12 years of age, in a family of seven. No history of consanguinity. Daylight was troublesome and provoked continual blinking. If the elder brother maintained the eyes opened in a strong light, after a few moments all appeared white to him. Vision improves at dusk. He is scarcely able to read, and his school work was so difficult that he went to work in a hat store, from which he was discharged because of his inability to distinguish colors.

Pupils react well to light and in accommodation. Fundus normal. Hyperopic astigmatism of half a diopter. Correction did not improve vision, which is only  $1/10$  for R. E. and  $2/10$  for L. E. Nystagmus is present and consists of small, very rapid, vertical movements, which do not increase on fixation. Red is mistaken with black; and colors selected according to their brightness.

In the younger brother, the symptoms were alike. Vision: R. E.  $1/10$ ?; L. E.  $1/10$ .

Clinical findings in cases of achromatopsia have exerted the greatest influence on the theories of color vision. Both the Young-Helmholtz and Hering theories needed to be modified in order to explain this condition. The first theory was modified by Parinaud and Charpentier, and holds that the function of the cones is restricted to color sensations and that the function of the rods is the perception of light and dark and also black and white.

These two systems do not work simultaneously. When the light is strong, the cones transmit the sensation of all colors to the brain, but when illumination decreases, the cones cease to become stimulated, and then the rods begin to perceive sensations by the destruction of the visual purple. As the regeneration is very slow, peripheral vision is always bad in normal eyes, particularly in low illumination for which the cones are not adapted. Hence the achromatopsia of the normal eye in darkness. Total achromatopsia is due to lack of cones in the macula.

This produces also the central scotoma and accounts for the poor vision of these patients and the nystagmus.

Hering's theory also is capable of explaining achromatopsia, if modified to admit the duplicity of the function

for the rods and cones as suggested by Parinaud and Charpentier. It will explain more easily the case of Raehlmann in which achromatopsia was attended with normal vision and photophobia and nystagmus were absent.

### SHORT ABSTRACTS.

Recent papers containing points of the greatest importance capable of presentation in this form are here noticed. For a systematic review of all the current literature in ophthalmology see "Digest of the Literature," a part of which is published each month.

**Demaria, E. B.—Hydatid Cyst in Eyeball.** (Boletín de la Sociedad de Oftalmología de Buenos Aires, Año IV, p. 41.)

Echinococcus is very common in Argentina, but an intraocular localization of this parasite has never been described. Demaria had been unable to find it in many hundreds of enucleated eyes sectioned at the Ophthalmic Clinic in Buenos Aires. This is the more surprising, because it is very common in all other parts of the body, even in the orbit (20 cases reported in Argentina); and by comparison with the cysticercus, which has so marked a tendency to grow in the eye, that some writers have considered it as its habitual place of living.

In the whole of ophthalmic literature there are only four cases reported as intraocular hydatid cysts; and of these only one is reliable. Yet both tenias, the solium and the echinococcus, live and migrate in the same manner in the body.

Prof. Demaria's patient presented slight pericorneal injection, the iris completely applied to the posterior part of the cornea, the lens cataractous, tension + 2; no light perception. An intraocular tumor with secondary glaucoma was diagnosed, and a trephining operation done, which relieved tension for a few days. But a new attack of pain having set in, the eye was enucleated.

Section of the globe gave exit to a transparent liquid, as clear as "water

from a rock;" and a cyst was discovered filling entirely the vitreous cavity, and adhering to the retina and lens. The cystic membrane was characteristic. No daughter vesicles were present but several proligerous vesicles adherent to the wall and containing scoleces could be observed.

An important characteristic feature was the absence of a pericystic membrane and of leucocytic infiltration; which the author attributes to the lack of inflammation of the tissues. The membrane is only a defensive reaction of nature against the parasite, and it seems that in this case the cyst only acted in a mechanical way during all its growth. This lack of inflammation makes a most important difference from the cysticercus, which always produces a great irritation on the tissues of the eye, intense cyclitis, disorganization and even sympathetic ophthalmitis.

The author reviews afterwards in detail the five cases reported in the literature (Gescheidt, Griffith, Werner, Wood and Scholtz), and only considers reliable that of Werner.

The modern methods of serodiagnosis (Appathie and Lorenz in Argentina, Guedini in Europe), have a great diagnostic value in echinococcus disease. It was positive in Demaria's case and is reliable and constant. Eosinophilia is to be found in about 67 per cent of the patients, and is not pathognomonic.

URIBE-TRONCOSO.

**Zeemann, W. P. C.—Binocular Perception of Brightness.** (*Nederl Tydschr. v. Geneesk.*, 1917, p. 265.)

Zeemann experimented with Otto Roelofs regarding binocularly observed brightness and the impressions which each eye separately received, especially when these impressions had an unequal brightness. Previously they had been able to demonstrate that in dark-adaptation summation of stimuli does not exist, neither in light adaptation; and they concluded that there is no question of a summation of the stimuli received from both sides during the formation of a binocular perception of brightness, anyhow while looking at larger brightnesses.

In contradiction herewith is the binocular threshold value for light perception lower than monocular. They thought that "the black which corresponds with the covered eye weakens the minimal white perceived in the other eye, because the absence of outlines on both sides make that both eyes have an equal part in the resulting perception, as to neither of the eyes a larger part in the perception is given by the presence of outline. The monocular determination was therefore not clearly monocular: only when one eye sees distinct outlines, sharp contrasts thus with greater brightness, then the weight of this is so preponderant for the binocular perception, that one can speak of a monocular observation.

This hypothesis, where the outlines play such a great role, and the significance already given to the outlines by Helmholtz induced them to find out more about the influence of these outlines and their significance. This was done by placing cartoons in the stereoscope, which were changed quickly. On all these cartoons at the right was a gray of stronger brightness than at the left. The sort of paper was the same for all. The gray which was perceived, was darker than the light and lighter than the dark field. The experiments seemed distinctly to prove the significance of the outlines; it makes entirely the impression as if the figure attracts the attention and so gives a preponder-

ant significance to the retinal image in the concerned eye.

Experiments now were done, so that the influence of the outlines in different parts of the visual field were different and thus the part of each retinal image of the binocular perception was not everywhere equal. The results of these observations are as follows:

1. If a grey of unequal brightness is seen by each eye, then in general the impressions will fuse; this is not a summation of the stimuli, as the binocular impression ought to be then always brighter than each monocular; it lies always between both.

2. The binocular impression is no constant quantity.

3. Specially the outlines give a preponderant significance to one of the retinal images.

4. This influence does not depend on light, contrast, etc., but on the force wherewith it directs the attention on one of the retinal images or parts thereof.

5. These experiments justify our supposition, that in the determination of the monocular threshold-value the part of both impressions is equal on account of absence of outlines, while with monocular observation of stronger illuminated fields the significance of the covered eye is reduced to a minimum through the one-sidedness of the outlines. If the absence of outlines is of influence on threshold determinations, we must expect that the same will happen when we use stronger illuminations, with exclusion of outlines; this can be done through determination of the so-called differential sensibility in stronger illumination.

The experiments confirm the expectations. The conviction is strengthened that the threshold determinations of the lightsense are nothing else than determinations of the sensitiveness of distinguishing, and that the same laws are binding for both. Moreover, we are convinced that the laws are not different from those which regulate binocular vision also with greater brightness and stronger contrast as well in light as in dark-adaptation.



The experiments illuminate sharply the intimate cooperation of both eyes even in circumstances where a clear exclusion of one was suspected, so from the other side is demonstrated strikingly in the experiments the independency of each system separately until in the higher centers; if the systems coming from both eyes should unite in lower cerebral parts an influence of outlines, as was here found, could not be thinkable.

E. E. B.

**Gowland, A.—Voluntary Nystagmus.** (Boletín de la Sociedad de Oftalmología de Buenos Aires, Año IV, p. 117.)

Before reporting his case, the author reviews all we know about nystagmus, its divisions, symptoms and etiology. The involuntary or ordinary nystagmus is defined according to Sauvigney's convulsive phenomenon related to an irritative lesion of the center commanding the associated lateral movements.

Voluntary nystagmus is very rare and the cases reported in the literature are very scarce. Dr. Gowland's patient was a man 36 years old in good health, who only wanted to have glasses fitted. He attributed the diminution of his vision to a "voluntary twitching" of his eyes. He was able to produce at will a horizontal nystagmus, which persisted in every direction in which the eyes were moved. Pupillary reaction normal; no hippus, no anisocoria; fundus normal. Refraction: simple hypermetropic astigmatism of one diopter.

During the oscillations all objects were seen moving.

A strong concentration of will power upon the eyes was necessary to produce the condition.

This voluntary twitching existed since childhood and was a source of merriment for him during his school days.

The father is dead; mother and two brothers living and in good health.

Voluntary nystagmus has been divided into three groups: rhythmic physiologic; true voluntary nystagmus, and the associated, or Strausky's and reflex, or Bar's. Affergeld, who studied the first type, showed that it occurs

with the lateral movements of the eyes, when rhythmic horizontal or rotatory, symmetric oscillations of the globe supervene, specially marked on the side to which the eyes are rotated. It is observed in subjects without any disease of the eyes, ears, or nervous system, and is probably the result of the muscular strain in forced lateral movements. The extreme conjugate deviation of the eyes, probably produces a stimulation similar to that provoked by vestibular stimulus, and extends to the rhythmic centers.

True voluntary nystagmus appears according to Raehlmann only in patients with marked visual anomalies which have existed from childhood, but Coppez's cases and also the one described by Gowland, show that visual anomalies are not necessarily present. Nystagmography showed that contractions are irregular, without definite character, of variable duration and changing from one twitch to the other.

Wecker has described a case associated with contraction of the pupil, and Coppez another with hippus. In this case the oscillations disappeared during the lateral movements.

The pathogeny of this rare condition, according to Coppez, must be ascribed to the following causes. In normal conditions the will acts only upon one center of association for moving the eyes in a lateral direction, but in nystagmus the voluntary stimulus goes to the centers on both sides, and if some kind of heterophoria is present the deviation at once appears. The position of the globes being modified and the ocular muscles subjected to an exaggerated tonus, react as usual by contraction and the nystagmus results.

The retraction of the lids during the twitching proves that the levator palpebrae also receive an exaggerated stimulus. Associated nystagmus described by Strausky in 1900 is a variety of voluntary nystagmus due to the defensive reaction of the organism and produced in an indirect way. It occurs in patients suffering from palpebral and corneal lesions or those with photophobia when an attempt to open the

lids is made. It has been observed also in perfectly normal subjects.

Bar described cases of conjunctivitis in which the retraction of the lid produced oscillations in the globes of an undulatory type probably due to a reflex movement by stimulation of the trigeminus. This may be caused also by a foreign body, a corneal ulceration or simply by any loss of epithelium of the cornea. The stimulus is transmitted to the bulbar nucleus of the trigeminus and by the posterior longitudinal fasciculus to the nucleus of the oculo-motor and its association centers.

U. T.

**Barraquer and Anduyned.—A Gentle Method for the Extraction of Cataract in Capsule.** (La Clinique Ophthalmologique, 1917, p. 328.)

These writers liken an incomplete cataract extraction to a simple evacuation of a cyst without destruction of its wall. All methods previously used tend to exert undue trauma of the eye, and are therefore dangerous. The authors discovered by means of experiments that a cupping glass with a suction of 45 c. m. of mercury applied to the anterior capsule lifted the lens without damaging the membrane. The instrument illustrated is a most ingenious device made of metal about the size of a 2 c. c. Luer syringe, with the cup like a small curette inserted in one end. The interior arrangement has two chambers connecting, and operated by two pneumatic cushions, which are controlled by the surgeon's thumb and finger. Pressure upon these buttons causes a vacuum of 50 c. m. in the chamber to which is fastened the tip, and the lens is removed without force, the results being most gratifying.

They call the operation Facodialysis

and the instrument "Erisifaco," the derivation being *eriseo* (tear out) and *facos* (lens).

J. S. W.

(This paper makes no mention of the previous successful application of the same principle by V. H. Hulen (Ophth. Rec. Dec., 1910). Dr. Hulen's method used a similar cup, with a vacuum secured without the specialized apparatus above described.—Ed.)

**Aymard, J. L.—A Cartilage Prosthesis for the Eye.** (The Lancet, Oct. 27, 1917.)

The writer says that the failure of the artificial eye from the cosmetic point of view depends upon two main factors, immobility and depression. The former condition is due to the absence of a mass of tissue fitting inside the artificial glass casing, and the latter to the fact that a sphere has been replaced by a shell. He considers that there can be no question of the advantage of the use of natural tissues for prosthesis in place of glass or metal. He employs spheres constructed from the costal cartilages and finds that these become connected by vascular communication with the blood vessels in the capsule or surrounding tissues. Two hemispheres are trephined from the eighth costal cartilage and pegged together with cartilage or fixed with catgut. The cartilage sphere is placed inside of Tenon's capsule and the latter sutured; then the conjunctiva is sutured. He has used the cartilage spheres only in nonseptic cases. But he believes it is worth while trying them in septic conditions also; since the resisting power of cartilage to sepsis has been found remarkable in nasal cases.

C. H. M.

# American Journal of Ophthalmology

Series 3, Vol. 1, No. 5.

May, 1918

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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## EDITORIALS.

### ECLIPSE BLINDING.

Opportunity to study the pathologic effects of exposure of the human retina to intense sunlight follows each important eclipse of the sun. After the eclipse that was visible from Northern Europe in April, 1912, there were more than twenty papers published in ophthalmic journals, that dealt with reports of cases of this form of injury, and they continued to appear for nearly three years after the eclipse. Isolated cases of such lesions produced in other ways occur, but the most important part of our knowledge of the subject has come from the eclipse cases.

The symptom always present, and which generally brings the patient under observation, is the central scotoma, appearing suddenly after the exposure and generally relative but sometimes absolute. Such a scotoma is hard to map, being small, usually not over  $1^{\circ}$  in diameter, involving the fixation point and often bilateral. In the majority of cases, it disappears within a month, but may last for several months, or prove quite permanent.

Sometimes scotomas occur in other parts of the field, relative ring scotomas having been noticed. Another subjective symptom is "dazzling" or "quivering" of objects, which may be very annoying and may continue even after central vision appears to be almost or quite up to standard. Color scotoma early and metamorphopsia at a late stage are frequent subjective symptoms.

Ophthalmoscopic changes are not always present; but in some series they have been noted in 80 per cent of the cases. Generally they are slight. Light spots on an abnormally dark macula are the most common; and next to that a general edema of the macular region with a cherry red spot at the fovea, which is found in the first days after the injury. But more severe and permanent injuries are not rare. Hemorrhage into the retina has been noted, sometimes persisting for a long time, even where ultimate recovery of vision occurred. Optic neuritis and optic atrophy seem to belong to certain cases of eclipse blinding, and white spots, al-



tered pigmentation of the macula and hole in the macula have been reported in numerous cases.

The prognosis is generally good. In nearly all cases, vision improves some. In many cases it ultimately reaches normal, altho often not for several months. In only a very few cases is there a progressive decline of vision. The prognosis is better the earlier the recovery begins, even tho months of annoying disability may intervene before it is complete. Unfavorable symptoms are metamorphopsia, marked changes of pigmentation, distinct white spots, hole in the macula, or optic atrophy.

Prevention of such injuries is the important practical matter connected with eclipse blinding. The dangerous exposure occurs thru ignorance and the remedy is education. This education can be most effectively given thru newspapers and popular magazines in the period when public interest in the subject is awakened just before the occurrence of such an eclipse. On June 8th, a total eclipse of the sun will be visible from the western and southern parts of the United States. The path of totality, lasting from one second to two minutes, will enter the United States north of the mouth of the Columbia river, and, passing southeasterly across a dozen states, will reach the Atlantic ocean, north of the center of the east coast of Florida. This eclipse will be a most striking phenomenon thruout a region inhabited by one hundred million people. In every part of the United States more than half the sun's disk will be hidden. The opportunity and responsibility for the education of the public will be a great one for the oculists living thruout this region. It is by rendering such public services that the profession can get and hold the leadership of public thought with regard to the matters on which its leadership should be admitted and recognized.

After the eclipse of April 17th, 1912, it was estimated by Werdenberg that 3,500 cases of eclipse blinding occurred in Germany. Cords learned of 387 cases, of which 166 were severe. Birch-

Hirschfeld reported 43 cases involving 50 eyes; and 39 cases involving 54 eyes, all but seven of which showed ophthalmoscopic changes were reported from the Tübingen clinic. If some such trail of disability does not follow the June eclipse, it will be because the intelligence of the American people is appealed to by a campaign of education. The time for it is short; what is to be done must be done at once. The agencies that can be used most effectively in this work are the newspapers and the public schools.

The eclipse of the sun is a striking opportunity for teaching children the rudiments regarding the movements of the heavenly bodies; and it will be utilized in a great many schools for that purpose. Along with such teaching should be some simple instruction with regard to the danger of watching the eclipse with unprotected eyes; and the means of avoiding such danger. The newspapers, always on the alert for what is sensational and exceptional, can be utilized to give the widest publicity to the subject of eclipse blinding, in the shortest time. If each reader of the *AMERICAN JOURNAL OF OPHTHALMOLOGY* will bring this matter to the attention of his local school authorities and local newspapers, a great deal of damage can be prevented.

The means of preventing eclipse blinding are extremely simple and universally available. It is merely necessary to reduce the light of the sun within the limits of what the human eye can stand without injury. Wherever a match and a piece of window glass are available, the old-fashioned smoked glass can be prepared. But a more cleanly, safe, convenient means is a piece of developed photographic film. The part of a rather dense negative that represents the sky may be all that is necessary; but film specially exposed and prepared for the purpose is better. Opticians, druggists and vendors of photographic supplies should be interested in seeing that the public is well supplied with this preventive of eclipse blindness. A card with a pin-hole in it can be used, provided the hole is not

more than one-half millimeter in diameter. But this is inferior to the photographic film.  
E. J.

## BLOOD PRESSURE AND INTRA-OCULAR PRESSURE.

The possible connection of glaucoma with increased blood pressure has been a subject of discussion ever since the clinical study of the blood pressure with the sphygmomanometer became common. But no general direct connection between the two has been demonstrated. \*They may be associated, but the association seems incidental rather than essential. Blood pressure on the average increases with age; glaucoma is chiefly a disease of later life. A certain number of cases of glaucoma, as the hemorrhagic cases, are secondary to vascular disease attended with high blood pressure. Certain toxic conditions will raise the blood pressure and may cause glaucoma.

On the other hand considerable statistical studies show no distinctly higher average of blood pressure in glaucomatous patients, than in non-glaucomatous patients of similar age. Glaucoma may arise, and especially simple glaucoma, in persons whose blood pressure is distinctly below the average; and it has been suggested that the essential pathologic condition in glaucoma may be a relative excess of intraocular pressure over blood pressure, impairing the nutrition of the intraocular tissues, and causing glaucomatous atrophy.

Nevertheless, from the laws of mechanics, necessarily operative in the eyeball, we must infer that a better understanding of blood pressure and the factors which are concerned in producing and regulating it, will help us to a better understanding of intraocular pressure. This gives interest and importance to the experimental studies of Priestley Smith on the "Blood Pressure in the Eye and Its Relation to the Chamber Pressure," two parts of which have been published in the *British Journal of Ophthalmology*.

When blood pressure is spoken of, generally the arterial pressure, and sometimes only the maximum or systolic pressure on the arteries, is referred to. It is easy to lose sight of the fact that the normal "blood pressure" varies from the maximum of 100 to 150 mm. of mercury on the walls of the aorta as the blood leaves the heart, to zero or a negative pressure as it returns thru the great veins. Probably the blood enters the eye under a normal systolic pressure of about 100 mm. of mercury, and leaves the eye under a pressure of 15 to 25 mm. of mercury. Between these two limits lie the possibilities of intraocular pressure, for in the living eye the nutritive fluid must be always entering and leaving it. Increased arterial pressure makes possible a higher intraocular pressure and perhaps the hardest eyeballs are only to be encountered in those who have high arterial pressure. Whether the intraocular tension can rise much above the systolic pressure in the arteries seems doubtful. But pretty certainly intraocular pressure is most closely related to the blood pressure in the capillaries.

It is the question of the capillary blood pressure that Priestly Smith takes up in his first papers. If an incompressible fluid flows thru a straight tube of uniform calibre at a uniform velocity, the decrease of pressure will progress regularly from the point at which the fluid enters the tube to its exit, the resistance overcome being the same at all points. But if the resistance be lowered at the middle of the tube, the pressure will diminish more rapidly in the first part and the pressure be lower at the centre than a mean between the two ends. On the other hand, if the resistance be increased at the centre, the pressure in the tube will fall more slowly in the first part and more rapidly in the latter part; and will be higher at the centre than the mean between the two ends.

In the eye with the branching of the arteries, the aggregate caliber of the vessels that carry the blood stream is increased. This tends to lower the resistance to its passage. But a channel

made up of small tubes offers very much more resistance to the passage of fluid, than does one of a single tube having a cross section equal to that of all the small tubes. In this way the subdivision of the arteries tends to increase the resistance offered to the passage of the blood. Thus the influence of the increased total cross-section in the capillaries is opposed by the influence of diminished caliber of the individual capillaries that furnish this increased aggregate cross-section.

From his experiments with fluid flowing thru glass tubes, his studies of the capillary circulation in the living frog, his examination of the injected vessels of the retina and his subjective observation of the capillary circulation of the blood in the macula, Priestley Smith concludes: "The probability seems to be that the blood-stream, as a rule, encounters more and more resistance (per unit of distance travelled) as it subdivides, and finds the maximum where the channels are most numerous, and where its essential work is done, namely, in the capillaries; but that variations in this respect are present in different parts, and occur in the same part at different times." It will be interesting to follow his application of these studies to a discussion of the relation of this capillary pressure to the intraocular tension.

There can be no question that it is in the capillary circulation that the great part of vital interchange of fluids takes place. This part of the blood-stream may be compared to the fall of a millstream over the mill wheel. Here is where the work is done. The flow of blood thru arteries and veins is comparable to the flow of the stream by which the water is carried to the mill wheel, and then conducted away after it has been used. It is this pressure, rapidly falling from arterial to venous in the capillaries, that we need to know more about.

The blood flows swiftly in the center of the stream and very slowly along the walls of the vessel. The resistance from friction, which is proportioned to the velocity, is therefore chiefly from friction between the particles of the

blood rather than between the blood and the vessel wall. The viscosity of the blood, its internal friction, has an influence of general and great importance in determining this resistance. If we can get the problems that confront us clearly stated, an important step will have been taken toward solving the relations of the different factors that determine blood pressure and intraocular pressure. E. J.

## INSTITUTION FOR EDUCATION OF BLINDED SOLDIERS

As is well known, the present war has been more prolific in wounds of the head than any previous one, because of the nature of the weapons used, high explosive shells and shrapnel; and of the character of the defense against attack employed, the trenches leaving the head most exposed to injury. A large proportion of these wounds affect the eyesight, either by direct injury to the eyeball or by injury to the fibers of the optic nerve or visual tracts somewhere in their course.

If only one eye is affected, the condition while deplorable, is not hopeless, as there are many occupations where monocular vision is sufficient for efficient work. On the other hand, an all too large number of cases of injury results either in complete blindness, or a diminution of vision below the amount necessary for even the ordinary affairs of life. What is the country doing or planning to do for these men? It would seem that now is the time to make preparations, and not after the possible flood of injured has rolled back upon us from the fields of war.

There are four possible ways of meeting the situation:

(1) Relegation of the injured to institutions previously established in various states.

(2) Establishment of such institutions in the several states.

(3) Establishment of one central institution, preferably in some large city, with adequate equipment and facilities for the disposal of articles manufactured.



(4) Provision for the aid of such soldiers in their own or other homes.

Plan number one has the defect that the existing institutions are too few and too small to care for the probable number. At the best, it would be but a makeshift, and it is time for the United States to get away from makeshifts.

Plan number two opens the way for "pork" and is less efficient than plan three, besides being more expensive in the beginning, and to maintain.

Plan number three is the ideal one. Care and housing of the injured, equipment and disposal of production are simplified.

Plan number four is more expensive and less efficient, but should not be totally discarded. There are a large number of blind soldiers who would prefer to live at home; and who could make a fair living in certain trades, such as piano tuning, weaving baskets, etc., if some way of marketing their products could be arranged. The increased expense should cheerfully be borne by the state, in view of the tremendous sacrifice these men have made.

A combination of plans three and four would be possible and workable, but should be started now. The experiences of the French and English could be drawn upon and modified to meet our conditions. There seems to be no representative popular body to take up the support of such measures, but the AMERICAN JOURNAL OF OPHTHALMOLOGY proposes to do all it can to urge on the attention of the profession and the public, this need of the war blind. What suggestions and assistance can our readers offer in this matter?

C. L.

## THE PRICE OF THIS JOURNAL.

When it was proposed to form this journal by the union of journals previously existing, it was pointed out that they cost \$34.50 per year, while by a merger avoiding duplication of read-

ing, there would also be avoided a duplication of expense: that for the smaller price of the one journal, all that was essential in its predecessors would be secured, and additional features of value would be possible. But probably few readers realize that, word for word, this journal costs less to its readers than any other ophthalmic journal published in the English language.

The relative price of a journal is not shown by the price per volume or the number of pages furnished per dollar. The number of words per page has to be taken into account. For instance, last year the *Ophthalmic Record* gave 652 pages of 428 words per page, 279,056 words for four dollars, or 69,764 words per dollar. The *Annals of Ophthalmology* printed 683 pages of 393 words per page, 268,419 words, or 67,105 words per dollar.

Estimated in this way, the price of the AMERICAN JOURNAL OF OPHTHALMOLOGY is less than the price of either of the journals merged to form it; and less than that of either of the other ophthalmic journals now published in English. The four numbers published give 382 pages, averaging 708 words per page. This amounts to 81,291 words per dollar of subscription price. The *British Journal of Ophthalmology* published last year 784 pages of 510 words per page, or 53,310 words per dollar. The *Archives of Ophthalmology* in 1917 published 611 pages of 374 words per page, or 45,703 words per dollar.

The AMERICAN JOURNAL OF OPHTHALMOLOGY will publish this year 26 per cent more matter than both of the other journals put together, and for 20 per cent less money. Of course this result is only rendered possible by our larger list of subscribers, by the support that has been given to this co-operative movement by the ophthalmologists of America. The essential fact is, there are enough ophthalmologists who are ready to spend ten dollars a year for the literature of their specialty to make such a publication possible.

E. J.

## OPHTHALMIC SECTION, A. M. A.

The largest annual meeting of ophthalmologists held anywhere in the world is that of the Section on Ophthalmology of the American Medical Association. This year when its chief rivals are all more immediately under the adverse influence of the war, its supremacy will be more striking than usual. The place of meeting, Chicago, the headquarters of the Association, within an easy journey of the great majority of its members, favors a good attendance; and a good series of practical subjects will be presented for discussion.

The local arrangements include five days of clinics extending from June 6th to June 11th. Besides its undergraduate and graduate medical schools, every large hospital and dispensary in the city has its ophthalmic department, which will be utilized to the full to provide instruction and entertainment for those who come to attend the meeting. The announcement of detailed plans will be found in the *Journal of the A. M. A.* If for no other reason, any ophthalmologist would be justified in going to considerable expense and inconvenience to attend the meeting and get his name on the register of Section members, in order that he might receive from year to year the pre-session volume of papers to be presented to the Section.

The section headquarters and meeting place will be at the Hotel La Salle.

### BOOK NOTICES.

#### TESTS FOR COLOR BLINDNESS,

by Dr. Shinobu Ishihara, Major, I. J. A. M. C., Tokyo, Japan. Sixteen colored plates with explanatory text. Tokyo, 1917.

Dr. Ishihara, who is instructor at the Military Medical Academy in Tokyo, has produced something novel in the way of tests for color blindness. They are the working out of a plan to which he first called attention in the *Nippon Gankwa Zasshi* (*Journal of Japanese Ophthalmologists*) in 1916. Each test is a plate of colored circles of various sizes. Part of these circles are of va-

rious shades and tints of one color constituting a figure; while the remainder are shades and tints of a color that is a confusion color for the first, and which form a background for the figure.

On most of the plates it is easy for the eye with normal color perception to see the figure against the background; but the color blind fail to perceive it. On a few, the coloring is such that the figure is more readily perceived by the color blind than by the normal sighted; and there is one plate on which the figures are equally well perceived by both.

The explanation and directions are given in English and also in Japanese. The work is a positive addition to our resources for the study of normal and defective color perception. E. J.

#### STATE LEGISLATION CONCERNING THE EYE, by Frank

Allport, M. D., LL.D., of Chicago. 8vo, 552 pages. Riddle & Wunderle Company, Chicago, Ill., 1917.

This volume includes a series of articles published in *Ophthalmology* in July, 1915, to July, 1917, to which has been added a brief preface. It is about as good and up-to-date a presentation of its subject as we can conceive possible; although, as the author points out, since the first article was printed, some legislatures have met and passed laws relating to the eye.

It is arranged according to the subjects of legislation as follows:

"Examination of School Children's Eyes, Ears, Noses and Throats," laws in 17 states, 27 pages.

"Legislation Concerning Ophthalmia Neonatorum in 31 States," 51 pages.

"Legislation Concerning Trachoma," special laws in 8 states, classing it as a contagious disease in 23 states, total 31 states, 17 pages.

"Legislation Concerning Wood Alcohol," 31 states, 34 pages; "Concerning Shop Lighting," 14 states; "Accidents," 22 states; "The Common Towel," 16 states; "Conditions of Labor Compensation," etc., 15 states; in all, 60 pages.

"State Legislation Concerning Optometry," 39 states, 144 pages.

"State Legislation Concerning the Blind," every state except Nevada, 216 pages.

Each chapter is paged separately and no table of contents is furnished. However, the grouping under one head of all the legislation in the different states relating to that particular subject makes it a very valuable work of reference for anyone studying legislation relating to any of these subjects.

It is a volume that has entailed an immense amount of labor in its preparation. As the author states, over 10,000 circular and personal letters were sent out to gather material for the book, and these supplemented by hours spent in law libraries. Such labor is only rendered possible by the strong desire that all ascertainable facts shall be known about the subject considered, the desire which is the basic motive of all truly scientific work.

No one who critically examines this book or goes to it for help, can fail to feel an added respect for its author and for the spirit of devotion to applied science and humanity that has prompted and sustained him in such an undertaking.

E. J.

**DYNAMIC OCULAR TESTS**, by Charles Sheard, Ph. D. 12mo., 143 pages, 33 illustrations. Columbus, Ohio. Published by the Author. Cloth, \$1.50; Paper, \$1.00. Columbus, Ohio, or any wholesale optical company.

Quite satisfactory explanations are here given, especially of the practice of "dynamic skiametry" in optical examinations. Indeed, it is so exhaustively treated that it may be esteemed a scientific essay for the use of the medical profession, and decidedly over the head of the refracting optician.

Certainly one can learn a great deal about refraction and accommodation without cycloplegia, but it goes without saying that such an examination of the eye is on a par with an examination of the heart or lungs through the clothes.

Be this as it may, the economic co-ordination of accommodation convergence and fusion convergence, which is to be taken into consideration in the prescribing of glasses is always to be done in the presence of active working of the ciliary body; and in many cases it greatly modifies the prescription of working lenses. Hence the study of such a book as this is of distinct value and it is recommended as such.

H. V. W.

In the literature of Optometry, there is an evident aim to be scientific and professional, altho it is often unpleasantly evident that these aims have been widely missed. A divergence of this kind is exhibited in the illustrative diagrams in this book, which use as test words "Applied Optics Ohio State University," a phrase that constitutes a perpetual reminder of its author's work as a teacher.

Nevertheless, there is a lesson to be learned from this book as to the importance of attention to minute details in practical work for the correction of anomalies of refraction and muscle balance—something that many ophthalmologists in active practice fail to appreciate. The emphasis here given to the practical importance of relative accommodation and convergence would be a wholesome corrective to some of the current routine methods of dealing with refraction cases.

E. J.

## CORRESPONDENCE.

### Ophthalmia Neonatorum Law.

*To the Editor:*—Dr. Frank Allport, in his letter regarding my article entitled "A Composite Ophthalmia Neonatorum Law," says, "In the first paragraph of the article he (Dr. Shastid) lays down the dictum, in italics, that the most important part of the whole procedure is the use of what he calls 'the Cr  d   drops' at birth \* \* \* But when he uses the substitutes—argyrol and protargol—he is not using the Cr  d   treatment."

My answer is that I have been guilty of no real inconsistency. In the first



paragraph of the article I was quoting a passage which expressed precisely my opinion, which as to the use of silver nitrat, coincides with Dr. Allport's. In the later portion of the article I was endeavoring to produce a composite ophthalmia neonatorum law. Let us take a familiar illustration. When a photographer makes a 'composite photograph of a family, lodge, or other group, he may, it is true, do a little retouching, but he does not try (if wise) to make of the composite photograph an ideal photograph—i. e., a representation of his own conception of what the human countenance ought to be. He merely eliminates the slighter defects, and the more important, or more salient, any given feature of the picture is, the more the photographer will attempt to preserve that feature. Such a feature belongs in a composite photograph. It is a group characteristic.

Now, it is Dr. Allport's failure to distinguish between my own ideal of a law on the matter in question and my well meant endeavor to produce a composite photograph of the laws already existing that made him think me inconsistent.

It is true that I speak in the article of producing "a law which should meet, as far as I could make it do so, the actual requirements of the situation." But an actual part of the situation, and one that is not to be ignored, is the fact that many doctors, even ophthalmologists, do not value the various prophylactics against ophthalmia neonatorum quite as do Dr. Allport and I. Did not this important difference of opinion exist, then we should not be able to find (as, however, we do actually find) that a number of existing statutes permit the use of argyrol and protargol, as well as of silver nitrat. I thought that a composite law would be the more likely to be a viable law because of its very compositeness.

I have said, or at least implied, that Dr. Allport's opinion as to the relative values of the three prophylactics mentioned in the proposed form of law is the same as mine. That is not quite

true. I agree with the doctor that the silver nitrat stands at the head of the list. But when the doctor says that "neither [argyrol nor protargol] is sufficiently strong [i. e., bactericidal] to be regarded as a safe prophylactic in the eyes of new born children," I believe he misappreciates these substances. For one thing, the question is not merely (I do not say "at all") a question of bactericidal powers. This phase of the question has been sufficiently dwelt upon by others, and need not here be expanded. I may also mention that a very careful accoucheur in a Paris hospital reported, ten or fifteen years ago, a very large number of births in which the only prophylactic that had been employed was simply normal salt solution. And there had not been one single case of ophthalmia neonatorum sequent on this measure.

It has also been contended that the weaker prophylactics (protargol and argyrol) have their weakness very much more than counterbalanced by the fact of their utter harmlessness; for (it is said) even a one per cent solution of silver nitrat is not totally devoid of danger if more than two or three minims thereof should be employed at one time. And doctors are often hurried, or stiff in the use of the fingers, so that more of the solution than is intended is now and then actually introduced. I have personally seen an accoucheur repeat the instillation of silver nitrat a considerable number of times in the course of a very few minutes. There is no prophylactic against blundering prophylaxis.

I, for one, am willing to agree that a one per cent solution of silver nitrat is the very best of all the various prophylactics against ophthalmia neonatorum. The practical question is this, Will the doctors in any given state submit to being restricted to the use of that one solution—nitrat of silver? If they will, I too am willing. Let us save babies' eyes. Moreover, let us have in all the states a law that is just as nearly uniform as possible.

In conclusion I wish to acknowledge an indebtedness which I ought to have mentioned in the article in which I

proposed the law in question. I refer to the excellent collection of ophthalmia neonatorum laws of the different states which appeared in "Ophthalmology," a number of year ago, and which owes its existence to the industry and humanity of Dr. Frank Allport. I did not wholly rely upon that collection, it is true, but consulted some original statutes in addition. Yet I found the collection of very great service, and, if it be not now too late, I wish to acknowledge my indebtedness to Dr. Allport's collection.

Very sincerely yours,

THOMAS HALL SHASTID.

Superior, Wis.

#### Methylene Blue for the Cornea.

*To the Editor:*—Let me add something to the correspondence published in the American Journal of Ophthalmology concerning the treatment of corneal ulcers with Methylene-blue.

The method used by me for the past six years was taught me by Dr. Meyer Weiner of St. Louis, Mo., and I find it an excellent treatment in old, deep, sloughing ulcers with undermined edges, where they seem so hard to clean.

Use one drop of saturated aqueous solution of methylene-blue every fifteen minutes until the patient has had six drops, instilling cocain to control pain. Finally dust surface of ulcer with powdered methylene-blue and apply a light protective bandage. At the end of twenty-four hours it will be seen that the blue has filtered through into the anterior chamber, and permeated the cornea all around the ulcer. This is followed by instillations of atropin 1 per cent. I have seen some beautiful results from it.

Sincerely yours,

T. WALKER WEAVER.

Wichita, Kan.

### BIOGRAPHIC NOTICES.

FLORENCE MAYO SCHNEIDEMAN, M. D.

PHILADELPHIA.

*Continued from page 296.*

MELLINGER, CARL, professor of ophthalmology and chief of the eye clinic of the University of Basel, died suddenly, May 21st. He contributed numerous articles relating to ophthalmology to both French and German journals, but will be best remembered for the inner-pole magnet devised to remove foreign bodies from the interior of the eyeball, which he first brought to the attention of the profession at the Tenth International Congress of Ophthalmology, held in Lucerne in 1904.

MILLS, JAMES, aged 65, of Janesville, Wis., a specialist on diseases of the eye, ear, nose and throat, was drowned in the Rock River, Janesville, Nov. 18th.

MOFFAT, JOHN LITTLE, of Ithaca, N. Y., a member of the American Ophthalmological, Otological and Laryngological

Society, for several years consulting ophthalmologist to the Cumberland St. Hospital, Brooklyn, editor of the *Journal of Ophthalmology, Otology and Laryngology* from 1901 to 1904; and of the *Homeopathic Eye, Ear and Throat Journal* from 1905 to 1910, died at his home Feb. 18th, from tuberculosis, aged 63.

NEILL, WILLIAM JOHN, of Chicago, an ophthalmologist, died at his home April 18th, from arteriosclerosis, aged 66 years.

NIEDEN, ADOLF, of Bonn, died during the latter half of the year, at the age of 70. He was once assistant to Saemisch. In 1874 he settled in Bochum as an ophthalmic surgeon, and left for Bonn in 1902. His investigations upon miners' nystagmus are well known, as are also

his several publications upon occupational diseases of the eye.

PERGENS, E., died during the latter half of the year in Maesyck, Belgium, where he was born and practiced. He made many investigations dealing with optotypes and wrote extensively upon the historical aspects of general medicine and ophthalmology. He was a foundation member of the Oxford Ophthalmological Congress.

PITCHER, MORRIS, Tuft's College Medical School, 1900, a specialist in diseases of the eye, ear, nose and throat, died at his home, Sardinia, N. Y., Jan. 17th, aged 31.

POSEY, ADDISON CORNELIUS, of Hanford, California, aged 68, a specialist in diseases of the eye, ear, nose and throat, was found dead in his home, May 31st, from heart disease.

PRITCHARD, MAHLON R., College of Physicians and Surgeons, Baltimore, 1880, former president of the Tioga County, Pa., Medical Society, a specialist on diseases of the eye, ear, nose and throat, died at his home, Westfield, Pa., Feb. 23rd, aged 64 years.

REILY, CHARLES GUY, of Los Angeles, a specialist in diseases of the eye, ear and throat, died at his home, May 26th, aged 58 years.

RICHARDSON, ROBERT McALLISTER, of Chattanooga, Tenn., a specialist on diseases of the eye, ear, nose and throat, died at his home, Sept. 18th, from tuberculosis.

ROBINSON, GEORGE WILLIS, of Shreveport, La., University of Pennsylvania, 1895, for three years house surgeon of the Manhattan Eye, Ear, Nose and Throat Hospital, New York City, died at his home, Feb. 4th, from pneumonia, aged 53.

ROBINSON, SAMUEL R., of Sturgis, Mich., a specialist in diseases of the eye, ear, nose and throat, died June 13th, after a surgical operation, aged 65 years.

SANTA CRUZ, MIGUEL, director of the National Ophthalmic Institute in Madrid, died during the latter half of 1916.

SARGEANT, FRANK LORING, of Victoria, Texas, died at his home, Nov. 11th, aged 45.

SCHIRMER, OTTO W. A., University of Griefswald, Germany, 1888, professor of diseases of the eye in the New York Post Graduate Medical School, ophthalmologist to the Knapp Memorial, St. Mark's and Bronx hospitals, New York, died May 6th, aged 52 years.

SCHOEN, PROF. W., of Leipsic, died during the latter half of the year at the age of 69.

SCHUR, MAX, born at Kitzingen in 1885, for a long time assistant in the eye clinic of Tubingen, died at Neu-Gaiesanka (Roumania) in 1916.

SHERMAN, HARRIS GRAY, of Cleveland, Ohio, a member of the American Academy of Ophthalmology and Otolaryngology, and American Ophthalmological Society, first medical inspector of schools of Cleveland, died Oct. 30th, aged 61, from pneumonia.

SNODGRASS, JESSE, of Kenton, Ohio, a specialist on diseases of the eye, ear, nose and throat, at one time president of the Northwestern Ohio Medical Association, Assistant Surgeon of the Eighth Tennessee Volunteer Infantry during the Civil War, died Dec. 8th, aged 77.

STANCULEANU, GEORGE, Professor of Ophthalmology in the University of Bucharest until the German invasion, died August 15th, at a sanatorium at Stamford, Conn., U. S. A. He was born in Roumania in June, 1874, and graduated in medicine at Paris. He was appointed Professor in the University of Bucharest in 1908, and since that time has been one of the most active writers and teachers of ophthalmology in Europe. His salary as Professor of Ophthalmology was divided among his assistants in amounts proportionate to their respective positions and lengths of service. Those who visited his clinic were most courteously received and given every available opportunity for observation and operation and found their contact with his work most instructive and inspiring. His day at the hospital began at 7:30 or 8 o'clock in the morning and ended with literary work in the evening.

With the entrance of Roumania into the war he placed his services at the dis-



posal of his government; and with the disastrous collapse of the Roumanian defense he found his way to Moscow. After annoying and wearing delay he made his way by Vladivostok to San Francisco, to solicit American help for the Roumanian Red Cross and Roumanian army. But prolonged overexertion and emotional strain caused a complete mental break down, which terminated in pneumonia. He will be most widely remembered for his operation for extraction of the crystalline lens in the capsule, having first systematized the use of the capsule forceps, which he had devised for this purpose. He cultivated close relations with the ophthalmologists of other countries; and had participated in the proceedings of the Oxford Ophthalmological Congress.—(H. F. Hantsell. *Ophthalmic Record*, v. 26, p. 598.)

TREITEL, PROF., of Königsberg, well known for his researches upon the light sense, died during the year.

VIBBARD, ARTHUR ALONZO, of Albany, N. Y., a specialist on diseases of the eye, ear and nose, died at his home, Jan. 19th, from pneumonia, aged 48 years.

WALKER, GORDON ALLEN, R. N., a former Ophthalmic House Surgeon at the Royal Infirmary, Sheffield, was killed in action Nov. 14, 1916, aged 28 years.

WALLING, W., Chicago, died during the latter half of the year, aged 68 years.

WINSLOW, WILLIAM HENRY, an officer in the U. S. Navy during the Civil War, a specialist on diseases of the eye, author of many historical novels concerning the Civil War, died at his home in Roxbury, Boston, April 8th, from pneumonia, aged 76 years.

WOLFF, B., New York, died during the latter half of the year, aged 42 years.

ZEHENDER, PROF. W. VON, once Professor of Ophthalmology in the Universities of Bern and Rostock, died during the first half of the year at the age of 91. In December, 1862, he founded the *Klinische Monatsblätter für Augenheilkunde*, which he continued to edit for thirty-seven years, when he transferred it to Axenfeld. In this journal are to be found most of a long series of papers that he wrote.

## BIOGRAPHIC SKETCHES.

THOMAS HALL SHASTID, M. D.

SUPERIOR, WISCONSIN.

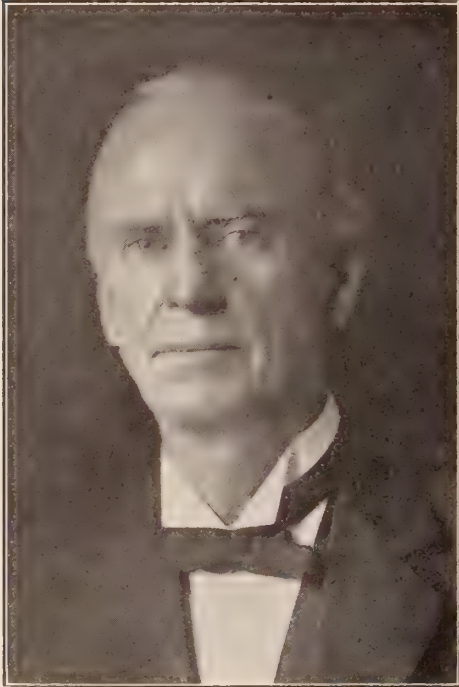
CHARLES HENRY CASTLE, a well-known ophthalmologist of Cincinnati, O., died January 21, 1918. He was born at Philadelphia, Penna., son of James H. and Phoebe Ann (Dick) Castle, November 28, 1862. His general education was received at the University of Pennsylvania, and his medical degree at the Miami Medical College, Cincinnati. From 1886 till 1890 he was receiving physician at the old Cincinnati Hospital, and from 1889 till 1899, a period of ten years, he studied the eye, ear, nose and throat with Dr. Robert Sattler, of Cincinnati. He was afterwards on the staff of Dr. Christian R. Holmes's private hospital. Dr. Castle was the first to use the Roentgen ray in Cincinnati, was one of the founders of the new Cincinnati General Hospital, a medical director of the The Federal Union Life Insurance Co., and a Fellow of the American College of Surgeons. He was a man of medium height, lean, muscular and very active. He married in 1905 Miss Meurice Abell. Of the union was born a son, Archibald. Dr. Castle's death is deeply regretted by the medical profession of Ohio.

ALBERT JEFFREY COX, ophthalmologist and oto-laryngologist of Superior, Wis., died of general arterio-sclerosis March 13. He was born at Trempeleau, Wis., March 2, 1862, was graduated at the Galesville, Wis., University, and at Rush Medical College, Chicago. He practiced in southern Minnesota for 26 years, and at Superior, Wis., for 4 years. He was a man of kindly, generous impulses, and had numerous friends.

ROBERT LOVE MOORE, of Columbia, S. C., died at the Columbia Hospital in that city, January 4, 1918. He is said to have had the largest ophthalmic and oto-laryngologic practice in the state. He was born at McConnellsville, York county, S. C., May 12, 1872, son of Joseph Palmer and Agnes Love Moore. His medical degree was received at the

University of Maryland, Baltimore, in 1896. He married Caroline C. White, of Rock Hill, S. C., May 31, 1899, and removed to Columbia in 1903.

He was resident physician to the Presbyterian Eye, Ear, Nose and Throat Hospital, Baltimore, in 1894-95, and oculist to the University of South Carolina from 1903 until his death. He was a small, stout man, fair and ruddy, and very quiet and deliberate in his manner. He was for years a deacon in the First Presbyterian Church, later an



Flavel B. Tiffany, 1846-1918

elder and the superintendent of the Sunday school. Excessive application to his practice caused a breakdown from which he could not recover.

FLAVEL BENJAMIN TIFFANY.—His friends in the ophthalmologic profession were shocked and grieved to learn of the death of Dr. Flavel B. Tiffany, of Kansas City, Mo. Born at Cicero, Oneida, county, N. Y., April 28, 1846, son of Ambrose and Electa Shepard, Tiffany, he early removed with his parents to Rutland, Dane county, Wisconsin, and afterward to Baraboo. The following year he removed again, to Rice

Lake, Minn., where his mother died.

The war breaking out, he enlisted at the age of seventeen in Battery B, Fourth Minnesota Light Artillery, and served till the close of the strife. Returning to Minnesota, he went to school at Faribault, living with a Dr. Bemis, and doing manual labor for his board. Before he was twenty years of age, he entered the State University at Minneapolis, but could not quite complete the literary course because of failing health, the result of overwork and great privations.

In 1872 he entered the Medical Department of the State University at Ann Arbor, Mich., receiving the degree of M. D. in 1874. He settled at first in Grand Haven, Mich., but, being unsuccessful, went again to Minnesota, thence to East St. Louis, where, however, he was once again unsuccessful. Returning once more to Minnesota, he was ably assisted by a worthy and wealthy lady, Mrs. Esther Fuller, and, settling at a town called Medford, soon had a very large practice.

In 1876-7 he studied the eye, ear, nose and throat at London, Berlin, Vienna, and Paris, in the latter city meeting Miss Olive E. Fairbanks, whom he afterwards married in Kansas City, in 1879.

In 1878 he settled as ophthalmologist and oto-laryngologist at Kansas City, Mo., and soon was widely known as lecturer and operator. In 1880 he founded the Kansas City University, in which institution he held the chair of ophthalmology, otology and microscopy till 1893. The chair of ophthalmology and laryngology he continued to hold till about the time of his death. For many years he was president of the institution.

Dr. Tiffany was oculist to the Burlington and the Missouri, Kansas and Texas railways. He was a Fellow of the American Medical Association, the Mississippi Valley Medical Association, Missouri Valley Medical Association, and the Tri-State Medical Association. He was president once of each of the two last mentioned organizations. He was also a member of the

City Club, of the Knife and Fork Club, a Republican, and an active member of the Episcopal church.

Dr. Tiffany was a small, spare man, smooth-faced, of fair complexion and with blue eyes and brown hair. He was brisk, alert, frank and friendly. Fond of travel, he made the "grand tour" twice, and sixteen separate trips to Europe. He liked music, and was greatly interested in the French language and people.

Dr. Tiffany's first wife died in 1910. In September, 1912, he married Miss Zoe Clark. Of this union were born two children, Flavel B. and Mary

Louise. The Doctor was 68 years of age when his son was born, and, as he often declared, this child was the crowning happiness of his life. He died at St. Luke's Hospital, Kansas City, Mo., January 4, 1918, of arterio-sclerosis.

Dr. Tiffany wrote numerous books and articles, the most important of the former being "Anomalies of Refraction and Diseases of the Eye," 1894; "A Trip Around the World by an Oculist;" "A Sojourn in Switzerland;" and "A Sojourn in Spain." The more important journal articles deal with cataract and glaucoma.

## NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. As these columns go to press on the 30th of the month contributors should send in their items by the 25th. The following gentlemen have consented to supply the News Item Editor with the news from their respective sections: Dr. H. A. Beaudoux, St. Paul; Dr. James A. Black, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. A. E. Davis, New York City; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. George F. Keiper, La Fayette, Indiana; Dr. George H. Kress, Los Angeles; Dr. W. Holbrook Lowell, Boston; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. George M. Waldeck, Detroit; Dr. Oscar Wilkinson, Washington. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered as well as all foreign countries. Volunteers are therefore needed and it is hoped that they will respond promptly to this call.

### DEATHS.

Prof. E. Hering, of Leipsic, died recently at the age of 83 years.

Dr. Kenneth Scott, of London, died February 19th, after an operation for appendicitis.

Dr. T. de Speyr, of Chaux-de-Fonds, Switzerland, died recently at the age of 50 years.

### CORRECTIONS.

The paper of Dr. Robert Scott Lamb, in the March number of the JOURNAL, (p. 183), was read before the Society of Ophthalmologists and Otologists, of the District of Columbia, November, 1917.

In the March number of the JOURNAL, (p. 209), the *Anales de Oftalmologia* is mentioned as closing its fifth volume. This should read, seventeenth volume.

In Dr. Franklin's article, page 237, column 1, line 35, should read "by itself produce a complete stereoscopic effect." Page 236, last line column 1 should read "association of stereognostic memory."

### PERSONALS.

Dr. E. H. Cary, of Dallas, Texas, is President of the Texas State Medical Society.

Dr. Fred Stauffer, of Salt Lake City, is President of the Utah State Medical Society.

On May 20th, Lieut.-Col. W. H. Wilmer of Washington, who is stationed at Mineola, L. I., will read a paper before the Section of Ophthalmology of the N. Y. Academy of Medicine.

Dr. Clark W. Hawley, of Chicago, has just undergone an operation for gall-bladder disease, and is making a good recovery.

Dr. John F. Campbell, of Chicago, has resumed his practice after an absence of about ten weeks, touring most of the western part of the continent.

Dr. Samuel D. Risley, of Philadelphia, will be the guest of honor at the coming meeting of the Eye, Ear, Nose and Throat Section of the State Medical Society at Columbus, Ohio. His address will be upon the subject of "Uveal Disease."

Dr. William Campbell Posey, of Philadelphia, delivered an address before the Quarterly Meeting of the Rhode Island Medical Society on "Some Industrial Injuries of the Eye" on March 7th, 1918. The lecture was illustrated with numerous slides. Dr. Posey is serving the Government as a member of one of the Local Examining Boards.

### COMING MEETINGS.

Section on Ophthalmology, American Medical Association, Chicago, June 11-14.



American Ophthalmological Society, Eastern Point, New London, Conn., July 9-10.

Oxford Ophthalmological Congress, Oxford, England, July 10-12.

American Academy of Ophthalmology, and Oto-Laryngology, with the Fourth Colorado Ophthalmological Congress, Denver, Colorado, August 5, 6, 7.

Pacific Coast Oto-Ophthalmological Society, Salt Lake City, August 12-13.

#### SOCIETIES.

Dr. S. Lewis Ziegler was elected acting President of the Ophthalmic Section of the College of Physicians for 1918.

Dr. William T. Shoemaker, the President of the Section, is with the Pennsylvania Hospital Unit in France.

Dr. G. Oram Ring, of Philadelphia, was recently appointed by the acting president of the College of Physicians, Dr. Thomas R. Neilson, as the ophthalmic member of the Alvarenga Prize Committee of the College.

Dr. Samuel D. Risley, Dr. S. Lewis Zeigler and Dr. William Campbell Posey, of Philadelphia, have been appointed as the Executive Committee of the Ophthalmic Section of the College of Physicians by the acting president for 1918.

Detroit has an Ophthalmological Club which is unique in more ways than one. Founded many years ago by several of the prominent eye men, it has been a source of ever increasing good fellowship among Detroit ophthalmologists. The club has no officers except a secretary. Each member in alphabetical order takes his turn as chairman at the monthly meetings, gives a dinner to his fellow members and presents a paper for their consideration. Cases of interest are presented before the meeting, and after the dinner a general discussion of paper and cases ensues. There are at present 18 members, six of whom are in active service in the army and two others hold commissions in the O. M. R. C. awaiting call.

The Oxford Ophthalmological Congress will assemble at Keble College, Oxford, on the evening of Wednesday, July 10th, 11th, and 12th. Thursday, the 11th, will be devoted to a discussion on "Ophthalmology and the War," to be opened by Sir William Job Collins, K. C. V. O., M. P. Friday, the 12th, will be given up to papers, demonstrations, and cases. No Official Dinner will take place. The Master of the Congress, Sydney Stephenson; Hon. Secretary, Bernard Cridland, of Wolverhampton.

The meeting of the American Academy of Ophthalmology and Oto-Laryngology, in Denver, August 6th, 7th, and 8th, under the presidency of Major Allen Greenwood, will devote one session to the "Reconstruction and Re-education of Disabled Soldiers." It will take the place of the meeting of the Fourth Colorado Ophthalmological Congress, and during the week following, August 12-13, the Pacific Coast Oto-Ophthalmological Society will be

held at Salt Lake City, Utah. It is expected that some members of the latter society will attend the Denver meeting, and members of the Academy, after the close of their meeting, will be able to make the trip to Salt Lake City, stopping at points of interest on the way.

#### MILITARY NOTES.

Dr. H. S. Gradle, Assistant to the Division Surgeon at Camp Grant, has been promoted to the rank of Major.

Major Thomas Woodruff, of Chicago, has been transferred to Camp Beauregard, Alexandria, Louisiana.

Lieut. Marcel Danis, of Brussels, one of our Collaborators, is in charge of the Eye Department in one of the hospitals at the Belgian front.

Captain Weekers, Professor of Ophthalmology at the University of Liege, has charge of the Eye Department in a hospital at the Belgian front.

Captain Louis Levy, of Memphis, Tenn., has been sent to Camp Mineola, Long Island, for duty.

Lieutenant J. Norman Risley, formerly of Philadelphia, Junior Medical Officer, Newport Training Station, Newport, Rhode Island, is doing special work in the eye, ear, nose and throat, preparing recruits for sea service.

Colonel Warlomont, of Brussels, Lieut.-Col. van der Straeten, Professor of Ophthalmology at the University of Louvain, Lieut. van Schevensteen, Jr., of Antwerp, and Lieut. Moret, of Charleroi, are on active duty in Belgian hospitals in France.

Lieut. W. W. Sauer, of Marietta, Ohio, enlisted as ophthalmic surgeon, M. R. C., has been assigned to duty in the Medical Research Laboratory, Hazelhurst Field Aviation Section Signal Corps, Mineola, Long Island, N. Y. Dr. A. J. Swezey of Iowa has assumed his practice during his absence.

Major Farrell, of Chicago, who has been home on a short leave of absence, while convalescing from his recent attack of pneumonia, brought back an interesting souvenir from the camp. A fragment of tin, 21 mm. long and 16 mm. wide, which was a part of a hand grenade that entered the eye through the upper lid, and was removed with forceps. About 25 per cent of the vitreous was lost. Bombs used in training are made from empty tin cans. Major Farrell has been obliged to enucleate several eyes injured in trench training.

Captain H. Maxwell Langdon, of Philadelphia, who was commissioned last July, remained in charge of the ocular examination of candidates for the Section of Aviation until February 23rd, when the work was discontinued temporarily because of the fact that the schools have their full quota of students. The examinations were made at the University of Pennsylvania.

Major George E. deSchweinitz, of Philadelphia, recently returned from a three months' tour of the base hospitals of France. The trip was undertaken at the request of the Surgeon

General for purposes of inspection of equipment along ophthalmologic lines. He is at present in Washington on official business but is expected to return to address the undergraduate school of the University of Pennsylvania on April 18th upon the results of his observations.

The names of the ophthalmologists serving on medical advisory boards of Philadelphia are as follows: Episcopal Hospital—Dr. G. Oram Ring, Dr. Harold G. Goldberg, Dr. William T. Van Pelt; Germantown Hospital—Dr. Howard D. Geisler, Dr. Carl Williams; Hahnemann Hospital—Dr. Frank O. Nagle; Jefferson Hospital—Dr. Howard F. Hansell, Dr. J. Scott Fritch, Dr. Charles R. Heed; Jewish Hospital, Dr. J. C. Knipe, Dr. Aaron Brav; Lankenau Hospital—Dr. Joseph Smith; Medico-Chirurgical Hospital—Dr. L. Webster Fox, Dr. O. F. Mershon; Methodist Episcopal Hospital—Dr. J. B. Turner, Dr. A. R. Renninger, Dr. W. W. Watson, Dr. T. W. Tait; Orthopedic Hospital—Dr. Hunter Scarlett; Presbyterian Hospital—Dr. James Thorington, Dr. McCluney Radcliffe; St. Agnes Hospital, Dr. J. A. Brophy, Dr. B. L. Gordon, Dr. W. C. Posey; St. Mary's Hospital—Dr. Lewis Love, Dr. Frank A. Murphy; St. Timothy's Hospital—Dr. Carl Williams, Dr. David Boon; Samaritan Hospital—Dr. L. C. Peter, Dr. G. A. Lawrence; University of Pennsylvania Hospital—Dr. H. Maxwell Langdon.

#### DETROIT MILITARY NOTES.

Capt. Wm. A. Macdonald has been in the British service at a Canadian eye hospital in France for the past year.

Capt. Ray Connor has just been called into active service and is now stationed at Cape May.

Capt. Robert Beattie, Lieut. Frank B. McMullen and Capt. Byron H. Jenne are commissioned in the Medical Reserve Corps awaiting call for active service.

Capt. George Frothingham has been in charge of the examination of the aviators in Detroit for the past eight months and is now expecting to leave shortly for service elsewhere.

Lieut. Frank Ryerson, who has assisted Capt. Frothingham in this aviation work, will accompany him. Lieut. Eugene Smith, Jr., is with Base Hospital No. 36 in France. Lieut. Duncan Campbell is with Base Hospital No. 17 in France. Lieut. Glenn Bulson is located at Fort Meyer.

Dr. Fred L. Johnson is leaving for France this month to join the Harvard University Base Hospital Unit No. 22 in the British service, with the commission of first lieutenant in charge of the eye, ear, nose and throat work.

Dr. Walter R. Parker, who has been in active service since last July, has recently been transferred to the National Army and made a Lt.-Col. in charge of the Section of Surgery of the Head, in the Surgeon General's office at Washington.

#### MISCELLANEOUS.

Owing to the great scarcity of paper the

Directors of the British Journal of Ophthalmology have decided as a temporary measure to reduce the number of pages in the Journal from an average of 64 to an average of 48.

Rosie Cohen, 9 years old, and blind, saved the lives of 16 other blind children at the Blind Babies' Home in Brooklyn. Awakened by smoke the girl groped her way through the rooms on the second floor, aroused each sleeping child, and quietly marshalled them into a court yard in the rear of the house. Officials of the home were not awakened until the children were passing out of the blazing building.

#### HONOR LIST.

This is a list of Ophthalmologists *now* in Service, in the Medical Department of the United States Army, arranged alphabetically by states.

##### ALABAMA

Lieut. Perdue, Jas. D. Mt. Vernon.

##### ARKANSAS

Lieut. Ramsey, J. W. Jonesboro.  
Capt. Vinsonhaler, F. Little Rock.

##### CALIFORNIA

Lieut. Dingemem, F. J. San Diego.  
Lieut. Hosford, W. J. Santa Cruz.  
Lieut. Ide, Clarence E. Los Angeles.  
Capt. Roberts, W. H. Pasadena.  
Maj. Swift, E. L. H. Los Angeles.  
Capt. Tupper, George. Long Beach.  
Maj. Wagner, H. L. San Francisco.

##### COLORADO

Capt. Bane, Wm. M. Denver.  
Capt. Finnoff, W. C. Denver.  
Maj. Magruder, A. C. Colorado Springs.  
Lieut. Sedwick, W. A. Denver.  
Lieut. Shields, J. M. Grand Junction.  
Capt. Stiles, Frank N. Grand Junction.

##### DISTRICT OF COLUMBIA

Capt. Chisolm, F. M. Washington.  
Capt. Huntington, W. H. Washington.  
Lieut. King, H. C. Washington.  
Lieut. Col. Wilmer, Wm. H. Washington.  
Capt. Wood, N. P. Washington.

##### GEORGIA

Lieut. Lang, G. H. Savannah.  
Maj. Lyle, Wm. C. Augusta.  
Lieut. McDougall, J. C. Atlanta.  
Lieut. Minchew, B. H. Waycross.  
Lieut. Smith, G. B. Rome.  
Lieut. Stockard, Cecil. Atlanta.

##### IDAHO

Capt. Maxey, E. E. Boise.  
Lieut. Thompson, J. W. Potlatch.

##### ILLINOIS

Lieut. Brown, Frederick L. Chicago.  
Lieut. Burkholder, C. A. Chicago.  
Lieut. Connor, A. B. Wheaton.  
Lieut. Darmer, G. A. Aurora.  
Capt. Farel, J. W. Quincy.  
Maj. Farrell, P. J. H. Chicago.  
Maj. Findlay, Ephraim K. Chicago.  
Lieut. Gailey, W. W. Bloomington.  
Maj. Gradle, Harry S. Chicago.  
Capt. Gunn, J. C. Belleville.  
Lieut. LaMothe, Elzear. Chicago.  
Capt. Lane, Francis. Chicago.  
Lieut. Lehman, Douglas A. Harrisburg.  
Capt. Lester, Harry Summer. Streator.  
Lieut. Rideout, William J. Freeport.  
Capt. Spitzer, Edw. Christian. East St. Louis.  
Lieut. Stevenson, Walter D. Quincy.  
Capt. Suker, G. F. Chicago.  
Lieut. Tallerdar, Geo. C. Chicago.  
Lieut. Valentine, J. A. Dixon.  
Lieut. Wilmot, C. M. Speer.  
Maj. Wood, Casey A. Chicago.  
Maj. Woodruff, T. A. Chicago.

##### INDIANA

Capt. Boner, G. W. Washington.  
Lieut. Van Mater, G. G. Peru.

IOWA  
 Lieut. Franklin, Daniel. Audubon.  
 Capt. Heard, Thos. M., Jr. Sioux City.  
 Capt. O'Brien, S. A. Mason City.  
 Lieut. Strong, A. C. Burlington.

KANSAS  
 Lieut. Allen, Geo. V. Topeka.  
 Capt. Fryer, J. L. Leavenworth.  
 Capt. Lockhart, Robert. Owensboro.

KENTUCKY  
 Lieut. McDaniel, R. F. Hopkinsville.  
 Lieut. Moremen, Lon B. Irvington.  
 Capt. Rau, Ernest. Bowling Green.  
 Lieut. Robertson, G. A. Louisville.  
 Capt. Smith, Orrin Leroy. Lexington.

MAINE  
 Lieut. Gray, Carl D. Portland.  
 Capt. Haskell, A. W. Portland.  
 Maj. Kershner, W. E. Bath.  
 Lieut. Williams, H. L. Auburn.

MARYLAND  
 Maj. Bordley, James, Jr. Baltimore.  
 Lieut. Steindler, L. F. Baltimore.  
 Capt. Tweedie, H. V. Baltimore.

MASSACHUSETTS  
 Lieut. Doyle, John H. Fall River.  
 Maj. Greenwood, Allen. Boston.  
 Maj. Lancaster, W. B. Boston.  
 Lieut. Leavitt, Frank C. Belmont.  
 Lieut. Merrill, Wm. H. Lawrence.  
 Lieut. Moncrieff, W. A. New Bedford.  
 Capt. O'Connor, Denis F. Worcester.  
 Lieut. Wright, C. W. North Adams.

MICHIGAN  
 Capt. Barton, Chas. Detroit.  
 Lieut. Brown, F. W. Bay City.  
 Capt. Connor, Ray. Detroit.  
 Lieut. Green, Burt F. Hillsdale.  
 Maj. MacNaughton, P. D. Calumet.  
 Capt. McKinney, A. R. Saginaw.  
 Lieut. Col. Parker, Walter R. Detroit.  
 Lieut. Whitmarsh, T. R. Detour.

MINNESOTA  
 Maj. Burch, Frank E. St. Paul.  
 Lieut. Canfield, Harry E. Willmar.  
 Capt. Harding, J. C. St. Paul.  
 Maj. Meyerding, E. A. St. Paul.  
 Maj. Todd, F. C. Minneapolis.

MISSISSIPPI  
 Capt. Carr, J. T. Summerland.

MISSOURI  
 Lieut. Feury, J. A. St. Louis.  
 Capt. Post, W. B. St. Louis.  
 Lieut. Woodruff, F. Eno. St. Louis

NEBRASKA  
 Capt. Dillon, Ira H. Auburn.  
 Lieut. Walker, C. W. York.  
 Capt. Wilson, E. T. O'Neill.

NEW HAMPSHIRE  
 Capt. Souter, W. N. Portsmouth.

NEW JERSEY  
 Capt. Marsh, Elias Jos. Paterson.  
 Capt. Vaughan, Harry. Morristown.  
 Lieut. Weiss, M. J. Bayonne.

NEW MEXICO  
 Lieut. Tinder, John W. Roswell.

NEW YORK  
 Lieut. Anderson, L. N. Brooklyn.  
 Capt. Burrows, Lorenzo, Jr. Buffalo.  
 Lieut. Caldwell, J. W. New York City.  
 Capt. Cavanagh, Paul Francis. Brooklyn.  
 Lieut. Chambers, A. L. New York City.  
 Capt. Crockett, R. L. Oneida.  
 Lieut. Dimock, Asa A. Valatie.  
 Lieut. Durand, A. C. Ithaca.  
 Capt. Hetrick, L. E. New York City.  
 Maj. Jean, G. W. New York City.  
 Lieut. Judge, H. V. Albany.  
 Capt. Krug, E. F. New York City.  
 Lieut. Lesser, H. R. New York City.  
 Capt. McKnight, W. C. New York City.  
 Lieut. Macklin, Walter F. Flushing.  
 Capt. Ritchie, F. G. New York City.  
 Lieut. Van Duzee, B. F. Holland.  
 Capt. Weed, H. M. Buffalo.

NORTH CAROLINA  
 Lieut. Adams, Noah B. Murphy.  
 Lieut. Ellen, C. J. Battleboro.  
 Lieut. Saliba, Michael. Wilson.

NORTH DAKOTA  
 Lieut. Bailey, Frederick H. Fargo.

OHIO  
 Lieut. Gorsuch, G. A. Bowling Green.

Capt. Harvey, J. H. Toledo.  
 Lieut. Kelly, J. E. National Military Home.  
 Capt. MacPhail, Don. E. Dayton.  
 Lieut. Mytinger, G. S. Portsmouth.  
 Lieut. Parker, W. H. Wellston.  
 Lieut. Postle, C. D. Columbus.  
 Lieut. Sattler, R. R. Cincinnati.  
 Maj. Schaeffer, Geo. C. Columbus.  
 Lieut. Smith, A. C. Akron.  
 Lieut. Stanbery, H. Cincinnati.

OKLAHOMA  
 Lieut. Means, J. F. Claremore.

PENNSYLVANIA  
 Lieut. Bailey, W. J. Connellsville.  
 Lieut. Bierman, Henry. Bloomsburg.  
 Lieut. Blackwood, Jas. M. New Castle.  
 Lieut. Bridgett, Frank A. Philadelphia.  
 Lieut. Chandlee, W. H. Philadelphia.  
 Lieut. Cowan, A. Philadelphia.  
 Maj. deSchweinitz, Geo. E. Philadelphia.  
 Capt. Eber, S. I., Pittsburgh.  
 Maj. Franklin, Clarence P. Philadelphia.  
 Capt. Gerhardt, P. H. Reading.  
 Lieut. Herbert, J. F. Philadelphia.  
 Lieut. Johnson, Elmer E. Philadelphia.  
 Lieut. Kaucher, C. L. Philadelphia.  
 Capt. Meanor, W. C. Pittsburgh.  
 Lieut. Picard, H. L. Philadelphia.  
 Lieut. Shafritz, N. G. Mont Alto.  
 Lieut. Shannon, C. E. G. Philadelphia.  
 Capt. Stahlmann, T. M. Pittsburgh.  
 Lieut. Stiles, Chas. M. Philadelphia.

RHODE ISLAND  
 Lieut. Connor, Chas. E. Providence.  
 Capt. Dyer, Wm. Henry. Providence.  
 Capt. Hawkins, J. F. Providence.  
 Lieut. Means, P. C. Apponaug.

TENNESSEE  
 Lieut. Bryan, James Leslie. Nashville.  
 Lieut. Chapman, T. C. Brownsville.  
 Lieut. Crawford, J. F. Nashville.  
 Maj. Ellett, E. C. Memphis.  
 Lieut. Hall, G. M. Lenoir City.  
 Capt. Miller, T. P. Nashville.  
 Lieut. Stanford, James B. Memphis.

TEXAS  
 Maj. Bowman, Newton H. Beeville.  
 Lieut. Compere, D. C. Dallas.  
 Lieut. Gibson, J. F. Paris.  
 Capt. McLean, F. T. El Paso.  
 Capt. Ralston, Wallace. Houston.

VERMONT  
 Capt. Marshall, Geo. G. Rutland.

VIRGINIA  
 Capt. Love, J. M. Norfolk.  
 Capt. Maxwell, G. M. Roanoke.  
 Capt. Olds, W. J. Front Royal.

WASHINGTON  
 Lieut. Kniskern, E. L. Centralia.

WISCONSIN  
 Lieut. Bennett, W. C. Rhinelander.  
 Maj. Black, Nelson M. Milwaukee.  
 Lieut. Brazeau, G. N. Racine.  
 Capt. Farnham, Chas. R. Milwaukee.  
 Lieut. Gillespie, W. W. Milwaukee.  
 Maj. Hogue, Gustavus I. Milwaukee.  
 Lieut. Provost, A. J. Oshkosh.

WYOMING  
 Lieut. Brown, Harold M. Sheridan.

STATE UNKNOWN  
 Lieut. Blassingame, C. W.  
 Lieut. Brown, W. E.  
 Lieut. Burne, J. E.  
 Capt. Campbell, C. H.  
 Capt. Cooper, E. H.  
 Maj. Davis, W. T.  
 Lieut. Dixon, Otto J.  
 Lieut. Griffith, Louis M.  
 Capt. Hayes, Harry S.  
 Lieut. Kelly, J. D.  
 Capt. McKee, C. N.  
 Lieut. Miller, T. A.  
 Capt. Osgood, W. W.  
 Lieut. Powers, M. H.  
 Lieut. Price, H. H.  
 Lieut. Prince, L. H.  
 Lieut. Reeves, A. C.  
 Lieut. Ryan, A. F.  
 Capt. Scott, J. R.  
 Lieut. Smith, F. C.  
 Lieut. Thompson, H. H.  
 Lieut. Wright, C. S.



# OPHTHALMIC LITERATURE.

Under this head continuing the "Index of Ophthalmology" heretofore published in **Ophthalmic Literature** will be found the subjects of all published papers received during the last month, that bear to an important extent upon ophthalmology. The subject is indicated rather than the exact title given by the author. Where the original title has been in a foreign language it is translated into English. The journal in which the paper is published will indicate the language of the original.

The names of the different journals are indicated by abbreviations which generally correspond to those used by the **Index Medicus**, the **Journal of the American Medical Association**, and the **British Journal of Ophthalmology**. We will from time to time publish the list of ophthalmic journals, with the abbreviations used for each. Often a single letter discriminates between journals published in different languages. Thus "Arch. of Ophth." refers to the Archives of Ophthalmology, published in English; "Arch. d'Opht.," indicates the French Archives d'Ophthalmologie; "Arch. de Oftal." refers to the Archivos de Oftalmologia Hispano-Americanos, while "Arch. di Ottal." indicates the Italian Archivio di Ottalmologia.

In this index of the literature the different subjects are grouped under appropriate heads; so that all papers bearing on the same, or closely related subjects, will be found in one group. The succession of the groups is the same from month to month, and identical with that of the Digest of the Literature. Where a paper clearly refers to two subjects that belong in different groups, it will be noticed in both groups.

Each reference begins with the name of the author in heavyface type. This is followed by the subject of his paper. Then in brackets a number with (ill.) indicates the number of illustrations, or a number with (pl.) the number of plates illustrating the article, (col. pl.) indicates colored plates. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that the paper was read before some society and gave rise to a discussion which is published with it.

The "repeated titles" may render accessible the essential part of a paper, the original of which could not be consulted. These give (in brackets) after the author's name the volume and page of this department of "Ophthalmic Literature" where the title of the paper will be found; and then the journal, volume, and page where the translation or abstract is published.

It is desired to notice every paper as soon as possible after it is published. Readers will confer a favor by sending titles they notice have been omitted, with journal and page of publication; and of their own papers, sending either a copy of the journal in which each appeared, or a reprint. These should be sent as soon as possible to 318 Majestic Building, Denver, Colorado.

## METHODS OF DIAGNOSIS.

**Affolter, A.** Ophthalmoscopic Examination with Red-free Light. Arch. f. Ophth., v. 94, Sept., 1917. Abst. Brit. Jour. Ophth., v. 2, p. 248.

**Chapman, V. A.** Records of Visual Acuity. Amer. Jour. Ophth., v. 1, p. 288.

**Koyanagi.** An Anguloscope (Modified Orthoscope) (2 ill.) Nippon Gank. Zasshi, Oct., 1917.

**Lloyd, R. I.** Perimetry and Campimetry. Jour. Amer. Inst. Homeop., v. 10, p. 1284.

**Masuda.** Change in Eye Gounds in Wassermann Reaction. Nippon Gank. Zasshi, July, 1917.

**Peter, L. C.** Artificial Daylight Illumination for Perimetric Study and General Office Use. Amer. Jour. Ophth., v. 1, p. 189.

**Sakamoto.** A Test Chart. Nippon Gank. Zasshi, July, 1917.

**Vogt, A.** Ophthalmoscopic Symptoms of Atrophy of Retina. Corresp. Bl. f. Schweizer Aerzte, v. 48, p. 51. Abst. Jour. Amer. Med Assn., v. 70, p. 964.

## THERAPEUTICS.

**Akatsuka.** Salvarsan and Neosalvarsan in Ocular Syphilis. Nippon Gank. Zasshi, August, 1917.

**Lapersonne, F. de.** Chloramin in Ophthalmology. Presse Méd., v. 26, p. 53. Abst. Jour. Amer. Med. Assn., v. 70, p. 1042.

**Maucione.** Therapeutic Value of Arsenobenzol and Mercuric Iodid in Ocular Syphilis. Arch. di Ottal., v. 24, p. 279.

**Nakamura.** Ocular Collyria. Nippon Gank. Zasshi, Nov., 1917.

## OPERATIONS.

**Santos Fernandez, J.** Absence of Dressings in Eye Operations. Arch. de Oftal. Hisp. Amer., Sept., 1917. Abst. Amer. Jour. Ophth., v. 1, p. 274.

**Toussant.** Portable Case Containing Ophthalmic Instruments for Army Surgeon. Arch. Méd. Belges, Feb., 1918.

## REFRACTION.

**Blanco, T.** Cinephotoscopia (Skiascopy). (3 Fig.) Arch. de Oft. Hisp.-Amer., v. 18, p. 16.

Cause and Prevention of Myopia. *Lancet*, Feb 9, 1918, p. 240.

**Edridge-Green, F. W.** Cause and Prevention of Myopia. *Lancet*, March 9, 1918, pp. 384, 483.

**Giri, D. V.** Cause and Prevention of Myopia. *Lancet*, March 16, 1918, p. 418.

**Green, J. Jr.** Painful Accommodation. *Amer. Jour. Ophth.*, v. 1, p. 240.

**Kambe.** Accommodation. *Nippon Gank. Zasshi*, July, 1917.

**Kirk, J.** Cause and Prevention of Myopia. *Lancet*, March 16, 1918, p. 418.

**Ochi.** Relation Between Ocular Muscles, Sclera, and Myopia. *Nippon Gank. Zasshi*, Dec., 1917.

**McClelland, E. S.** Refraction in Children. *Calif. State Jour. Med.*, v. 16, p. 180.

**Mottram, J. C.** Cause and Prevention of Myopia. *Lancet*, March 16, 1918, p. 417.

**Nutting, P. G.** Manufacture of Optical Glass in America. *Science*, v. 25, p. 607.

**Sturm, S. A.** Impairment of Vision Due to Temporary Paralysis of Accommodation. *Pittsburgh Ophth. Soc.*, Jan. 7, 1918. *Penn. Med. Jour.*, v. 21, p. 421.

**Thompson, A. H.** Eye Strain. *Lancet*, April 6, 1918, p. 515.

**Wilson, J. A.** Eye Strain. *Lancet*, March 9, 1918, p. 384.

#### OCULAR MOVEMENTS.

**Crisp, W. H.** Congenital Paralysis of External Rectus Muscle. (Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 172.

**Franklin, I.** Stereoscopic and Perspective Vision. *Amer. Jour. Ophth.*, v. 1, p. 236.

**Guthrie, D.** Acute Otitis Media with Paralysis of Sixth Nerve. *Edin. Med. Jour.*, July, 1917. *Abst. Brit. Jour. Ophth.*, v. 2, p. 240.

**Jacobs, M.** Latent Nystagmus. *Amer. Jour. Ophth.*, v. 1, p. 171.

**Lancaster, W. B.** Satisfactory Operation for Muscle Shortening or Advancement. (16 Fig.) *Amer. Jour. Ophth.*, v. 1, p. 161.

**Marin, M. A.** Ocular Paralysis of Traumatic Origin. (3 Fig. Bibl.) *Arch. de Oftal. Hisp.-Amer.*, v. 18, p. 70.

**Moore, R. W.** Amblyopia ex Anopsia. *Texas State Jour. Med.*, v. 13, p. 381.

**Murdock, J. F.** Ptosis and Abducens Paralysis. *Pittsb. Ophth. Soc.*, Feb. 4, 1918. *Amer. Jour. Ophth.*, v. 1, p. 277.

**Ochi.** Ocular Muscles in Japanese. *Nippon Gank. Zasshi*, July, 1917.

**Onishi.** A Stereoscope. (9 ill.) *Nippon Gank. Zasshi*, Nov., 1917.

**Parsons, R. P., and Segar, L. H.** Bárány Chair Tests and Flying Ability. (Nystagmus.) *Jour. Amer. Med. Assn.*, v. 70, p. 1064.

**Theory of Ocular Movements.** *Rhode Island Med. Jour.*, April, 1918, p. 62.

#### CONJUNCTIVA.

**Allport, F.** Prophylaxis of Ophthalmia Neonatorum. *Amer. Jour. Ophth.*, v. 1, p. 216.

**Crossley, E. R.** Chronic Hypertrophic Conjunctivitis. *Chicago Ophth. Soc.*, Dec., 1917. *Amer. Jour. Ophth.*, v. 1, p. 196.

**Fernandez, J. S.** Diseases of Eyes in Cuba. *New Orleans Med. and Surg. Jour.*, v. 70, p. 717.

**Herron, J. T.** Purulent Conjunctivitis. *Tenn. State Med. Assn. Jour.*, v. 10, p. 445.

**Hiwatori.** Trachoma, Microscopic Demonstration of Specimens. *Nippon Gank. Zasshi*, July, 1917.

**Jackson, E.** Vernal Conjunctivitis. (Dis. Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 259.

**Mine.** Parinaud's Conjunctivitis. (Bibl.) *Nippon Gank. Zasshi*, Oct., 1917.

*Ophthalmia Neonatorum.* *Brit. Jour. Ophth.*, v. 2, p. 232.

**Penichet, J. M.** Vaccine Treatment of Trachoma. *Cron. Med. Quir. de la Habana*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 195.

**Rasquin.** Provoked Conjunctivitis. *Arch. Méd. Belges*, April, 1917. *Amer. Jour. Ophth.*, v. 1, p. 274.

**Sakai.** Chemotherapy for Pneumococcal Conjunctivitis. (Optochin.) *Nippon Gank. Zasshi*, July, 1917.

**Streptococcal Infection and Fraenkel's Pneumococcus Infection.** (Bibl.) *Nippon Gank. Zasshi*, Nov., 1917.

**Samperi, G.** Provoked Conjunctivitis. *Arch. di Ottal.*, v. 24, p. 265.

**Shastid, T. H.** Ophthalmia Neonatorum. *Law. Amer. Jour. Ophth.*, v. 1, p. 290.

**Takayasu.** Etiology of Parinaud's Conjunctivitis. (Bibl.) *Nippon Gank. Zasshi*, Dec., 1917.

**Wakisaka.** Trachoma in Japan. *Nippon Gank. Zasshi*, July, Sept., 1917.

**Watanabe.** Plasma Cells and Russell's Nodules in Ocular Disease. *Nippon Gank. Zasshi*, Oct. and Nov., 1917.

#### CORNEA AND SCLERA.

**Amoretti, E.** Keratoconus and the Internal Secretions. *Arch. de Oft. Hisp.-Amer.*, v. 18, p. 25.

**Cosmetatos, G. F.** Syphilitic Corneal Disease. *Grèce Méd.*, v. 19, p. 39. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 1199.

**Cridland, A. B.** Eczematous Keratoconjunctivitis. (Bibl.) *Brit. Jour. Ophth.*, v. 2, p. 193.

**Fuchs, E.** Keratitis Pustuliformis Profunda. *Arch. f. Ophth.*, v. 90. *Abst. Brit. Jour. Ophth.*, v. 2, p. 244.

**Hird, R. B.** Phlyctenular Disease and Its Relation to Tuberculosis. (1 Chart, Bibl.) *Brit. Jour. Ophth.*, v. 2, p. 215.



**Matsuoka.** Corneal Keratosis with Skin Keratosis. *Nippon Gank. Zasshi*, August, 1917.

**Myashita.** Diffuse Superficial Keratitis Aside from Conjunctival Inflammation. (Ill.) *Nippon Gank. Zasshi*, Sept., 1917.  
Superficial Catarrhal Keratitis. *Nippon Gank. Zasshi*, August, 1917.

**Nakamura.** Green Discoloration of Cornea with Fluorescein. (Bibl.) *Nippon Gank. Zasshi*, July, 1917.

**Nogawa.** Tubercle Formation in Parenchymatous Keratitis. (1 ill. Bibl.) *Nippon Gank. Zasshi*, Dec., 1917.

**Olsho, S. L.** Superficial Punctate Keratitis. *Sec. on Ophth. Coll. Phys.*, Phila., Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 205.

**Posey, W. C.** Corneal Haze. *Wills Hosp. Ophth. Soc.*, Feb. 5, 1918. *Pa. Med. Jour.*, v. 21, p. 482.

**Risley, S. D.** Tuberculous Keratitis. *Wills Hosp. Ophth. Soc.*, Dec. 4, 1917. *Amer. Jour. Ophth.*, v. 1, p. 281.

**Sakai.** Sensibility of Cornea and Conjunctiva. *Nippon Gank. Zasshi*, Dec., 1917.

**Sato.** Treatment of Tubercle of Cornea. (3 pl. Bibl.) *Nippon Gank. Zasshi*, Sept., 1917.

**Spurway, J.** Fragilitas Ossium and Blue Sclerotics. *Brit. Jour. Ophth.*, v. 2, p. 244.

**Wagner, L. H.** Keratitis Disciformis. *Amer. Jour. Ophth.*, v. 1, p. 267.

**Wyler, J. S.** Methylene Blue for Corneal Staining. *Amer. Jour. Ophth.*, v. 1, p. 290.

**Zentmayer, W.** Nodular Degeneration of Cornea. *Sec. on Ophth. Coll. Phys.*, Phila., Nov. 15, 1917. *Amer. Jour. Ophth.*, v. 1, p. 204.

#### ANTERIOR CHAMBER AND PUPIL.

**Ravenswaaij, A. van.** Auditory Dilatation of Pupil. *Nederl. Tijdschr. v. Geneesk.*, 1918, p. 289. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 1199.

**Seto.** Experimental Resorption from Anterior Chamber with Colorimetric Research. *Nippon Gank. Zasshi*, Oct., Nov., Dec., 1917.

Repeated Titles. **Roche** (v. 1, p. 78). *Amer. Jour. Ophth.*, v. 1, p. 192.

#### UVEAL TRACT.

**Kano.** Peripapillary Choroiditis. (6 ill.) *Nippon Gank. Zasshi*, Dec., 1917.

**Markel, J. C.** Complete Aniridia. *Pittsb. Ophth. Soc.*, Jan. 7, 1918. *Pa. Med. Jour.*, v. 21, p. 421.

Repeated Titles. **Darier** (v. 1, p. 78). *Amer. Jour. Ophth.*, v. 1, p. 275.

#### SYMPATHETIC DISEASE.

**Mansilla, S. G.** Enucleation in Sympathetic Ophthalmia. *Rev. de Med. y. Cirug. Praticas*, v. 118, p. 33. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 1045.

#### GLAUCOMA.

**Faith, T.** Iridodasis for Primary Glaucoma. *Chicago Ophth. Soc.*, Dec., 1917. *Amer. Jour. Ophth.*, v. 1, p. 198.

**Lamb, R. S.** Theory as to Etiology of Glaucoma. *Amer. Jour. Ophth.*, v. 1, p. 183.

**Tristaino, B.** Sclero-corneal Trephining of Elliot. *Arch. di Ottal.*, v. 24, p. 245.

**Zentmayer, W.** Glaucoma Trephining. *Wills Hosp. Ophth. Soc.*, Jan. 7, 1918. *Pa. Med. Jour.*, v. 21, p. 422. *Amer. Jour. Ophth.*, v. 1, p. 203.

#### CRYSTALLINE LENS.

**Allport, F.** Smith-Indian Intracapsular Operation for Cataract. *Jour. Mich. State Med. Soc.*, v. 17, p. 137.

**Andrade, C. de.** Congenital Cataract. *Brazil-Med.*, 1917, p. 349.

**Garcia.** Cataract Complicated by Hysterical Amaurosis. *Abst. Amer. Jour. Ophth.*, v. 1, p. 274.

**Herbert, H.** Maximal Perchloride Irrigation of Conjunctiva in Cataract Extractions. *Indian Med. Gaz.*, 1917, p. 400.

**Husain, T.** New Operation for Cataract. *Indian Med. Gaz.*, v. 53, p. 12.

**Ishida.** Cataract from Disturbance of Nutrition (Sclerodermia). (2 ill.) *Nippon Gank. Zasshi*, August, 1917.

**Jervy, J. W.** Safety First in Cataract Operation. *South. Med. Jour.*, v. 11, p. 314.

**Kirkpatrick, H.** After Treatment of Cataract Extraction by Shield. *Indian Med. Gaz.*, v. 52, p. 401.

**Komoto.** Cataract Extraction. (2 ill.) *Nippon Gank. Zasshi*, Sept., 1917.

**Paine, H. S.** Operation for Extraction of Lenses Dislocated into Vitreous. (Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 177.

**Radcliffe, McC.** Panophthalmitis Following Cataract Extraction. *Wills Hosp. Ophth. Soc.*, Feb. 5, 1918. *Pa. Med. Jour.*, v. 21, p. 481.

**Santos Fernandez, J.** Age and Cataract Extraction. *Rev. de Med. y. Ciurg.*, v. 23, p. 93. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 1198.

Indications for Cataract Extractions. *Rev. Med. Cubana*, v. 29, p. 14.

**Schwenk, P. N. K.** Infection Following Cataract Operations. *Wills Hosp. Ophth. Soc.*, Feb. 5, 1918. *Penn. Med. Jour.*, v. 21, p. 481.

#### VITREOUS.

**Elliot, R. H.** Vitreous Changes from Penetrating Septic Wounds. (Couching.) (Dis.) *Ophth. Sec. Roy. Soc. Med.*, Feb. 6, 1918. *Amer. Jour. Ophth.*, v. 1, p. 279.

#### RETINA.

**Argañaraz, R.** Pigmented Chorioretinitis. (2 Fig., 1 col. pl., Bibl.) *Arch. de Oftal. Hisp.-Amer.*, v. 18, p. 11.



- Circinate Degeneration of Retina. (1 col. pl., 5 Fig., Bibl.) Arch. de Oft. Hisp.-Amer., v. 18, p. 59.
- Basterra y Santa Cruz.** Typical Retinitis Circinata. (2 Fig., 1 col. pl.) Arch. de Oftal. Hisp.-Amer., v. 18, p. 1.
- Brown, E. V. L.** Embolus of Macular Artery. Chicago Ophth. Soc., Dec., 1917. Amer. Jour. Ophth., v. 1, p. 197.
- Ferree, C. E., and Rand, G.** Power of Eye to Sustain Clear and Comfortable Seeing with Different Illuminants. (2 Fig. Bibl.) Amer. Jour. Ophth., v. 1, p. 252.
- Keiper, G. F.** Blood Pressure and Intraocular Hemorrhage. Amer. Jour. Ophth., v. 1, p. 289.
- Göthlin, G.** Wave Energy for Sensation of Red, and Its Dependence on Wavelengths of Light. Proc. Roy., Swedish Acad. of Sc., v. 58, No. 1.
- Ishihara.** Color of Normal Eye-ground in Japanese. (2 ill.) Nippon Gank. Zasshi, July, 1917.
- Masuda.** Etiology of Chronic Retrobulbar Neuritis. Nippon Gank. Zasshi, Sept., 1917. Central Retinitis. Nippon Gank. Zasshi, August and October, 1917.
- Matsuoka.** Central Retinitis. (Statistics.) Nippon Gank. Zasshi, Sept., 1917. The Blind Spot. Nippon Gank. Zasshi, July, 1917.
- Nakamura.** Oguchi's Disease. Nippon Gank. Zasshi, Aug., 1917. Retinal Degeneration and Multiple Military Aneurysms. (Bibl. 1 col. pl.) Nippon Gank. Zasshi, Sept., 1917.
- Night Blindness.** Arch. de Oft. Hisp.-Amer., v. 18, p. 56.
- Ormond, A. W.** Contraction of Central Retinal Artery. Ophth. Sec. Roy. Soc. Med., Feb. 6, 1918. Amer. Jour. Ophth., v. 1, p. 280.
- Suganuma.** Pathologic Changes in Choroidal Hyaloid Membrane and Retinal Pigment Epithelium. Nippon Gank. Zasshi, August, 1917.
- Vogt, A.** Ophthalmoscopic Symptoms of Atrophy of Retina. Corresp.-Bl. f. Schweizer Aerzte, v. 48, p. 51. Abst. Jour. Amer. Med. Assn., v. 70, p. 964.
- Wada.** Hereditary Progressive Degeneration of Macula. (1 col. pl., 3 ill., Bibl.) Nippon Gank. Zasshi, Oct., 1917.
- Repeated Titles. **Kirk, J.** (v. 1, pp. 158, 220.) Amer. Jour. Ophth., v. 1, p. 275.
- TOXIC AMBLYOPIAS.**
- Krauss, W.** Quinin Amblyopia. South. Med. Jour., v. 11, p. 334.
- Gibson, J. L.** Diagnosis, Prophylaxis and Treatment of Plumbic Ocular Neuritis in Children. Med. Jour., Australia, Sept. 8, 1917. Brit. Jour. Ophth., v. 2, p. 239.
- Plumbic Optic Neuritis. Med. Jour., Australia, July 28, 1917. Brit. Jour. Ophth., v. 2, p. 239.
- Roberts, T. F.** Toxic Amblyopia. Texas State Jour. Med., v. 13, p. 389.
- Robinson, J. M.** Toxic Action of Emetin on Eye. (Bibl.) Amer. Jour. Ophth., v. 1, p. 245.
- OPTIC NERVE.**
- Behr, C.** Nutrition of Optic Nerve and Its Connection with Tabetic Atrophy. Klin. Monatsbl. f. Augenh., Sept.-Oct., 1917. Brit. Jour. Ophth., v. 2, p. 233.
- Kershner, W. E.** Secondary Optic Atrophy Due to "Gassing." (1 ill.) Amer. Jour. Ophth., v. 2, p. 168.
- Place, E. C.** Optic Neuritis from Sphenoid and Posterior Ethmoid Suppuration. Long Island Med. Jour., v. 12, p. 81.
- Possey, W. C.** Salvarsan in Causation of Optic Neuritis. Wills Hosp. Ophth. Soc., Jan. 7, 1918. Amer. Jour. Ophth., v. 1, p. 202.
- Sturm, S. A.** Primary Optic Atrophy. Pittsburgh Ophth. Soc., Feb. 4, 1918. Penn. Med. Jour., v. 21, p. 480. Amer. Jour. Ophth., v. 1, p. 277.
- VISUAL TRACTS AND CENTERS.**
- Franklin, I.** Stereoscopic and Perspective Vision. Amer. Jour. Ophth., v. 1, p. 236.
- Fridenberg, P.** Visual Factors in Equilibration, Especially Aviation. Jour. Amer. Med. Assn., v. 70, p. 991.
- Heitmüller, G. H.** Developmental Alexia or Congenital Word Blindness. Washington Med. Ann., v. 17, p. 124.
- Hughes, L. J.** Monocular Diplopia. Chicago Ophth. Soc., Dec., 1917. Amer. Jour. Ophth., v. 1, p. 201.
- Rasquin, E.** Hemianopsia. (1 pl. Bibl.) Arch. Méd. Belges, Jan., 1918.
- Symms, J. L. M.** Mirror Writing. Practitioner, v. 100, p. 283.
- Taft, A. E.** Proportion of Gray and White Matter in Human Brain Made Through Plane of Optic Chiasm. Jour. Nerv. and Ment. Dis., v. 47, p. 161.
- Repeated Titles. **Holmes** (v. 1, p. 159.) Amer. Jour. Ophth., v. 1, p. 270.
- COLOR VISION.**
- Ishihara.** Congenital Color Blindness. Nippon Gank. Zasshi, Dec., 1917.
- Malling, B.** Color Sense. Norsk. Mag. for Laegevid., v. 79, p. 1. Amer. Jour. Ophth., v. 1, p. 362.
- Oguchi.** Transitory Red and Green Blindness. Nippon Gank. Zasshi, July, 1917.
- EYEBALL.**
- Angelucci, A.** Problem of Immediate Enucleation. Arch. di Ottal., 1917, p. 159. Amer. Jour. Ophth., v. 1, p. 269.
- LACRIMAL APPARATUS.**
- Rochat, G. F.** West-Polyak Operation for Chronic Obstruction of Lacrimal Duct. Nederl. Tijdschr. v. Geneesk., v. 1, 1918, p. 284.

**Toledo, R. A.** The Tears, a Test of Actual Death. *Cron. Med.*, v. 35, p. 20. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 1197.

### LIDS.

**Bérard, L.** Edema of Lids with Abscess. *Rév. Gén. de Clin. et de Thérap.*, v. 31, p. 168.

**Guilleuma, J. M. S.** Acute Edema of Lids. *Arch. de Oft. Hisp.-Amer.*, v. 18, p. 99.

**Komoto.** Lid Formation. *Nippon Gank. Zasshi*, August, 1917.  
Abnormal Unilateral Lid Movements with Laughter. (Ill.) *Nippon Gank. Zasshi*, July, 1917.

**Murdock, J. F.** Ptosis of Left Upper Lid. *Pittsb. Ophth. Soc.*, Feb. 4, 1918. *Penn. Med. Jour.*, v. 21, p. 480.

**Posey, W. C.** Bilateral Coloboma of Lid. *Sec. on Ophth.*, *Coll. Phys.*, Phila., Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 204.  
*Epicanthus.* *Sec. on Ophth.*, *Coll. Phys.*, Phila., Nov., 1918. *Amer. Jour. Ophth.*, v. 1, p. 204.

Synchronous Movements of Lid and Jaw. *Sec. on Ophth.*, *Coll. Phys.*, Phila., Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 205.

**Wyler, J. S.** Canthoplasty for Trachomatous Conditions. (3 ill.) *Amer. Jour. Ophth.*, v. 1, p. 231. *Ohio State Med. Jour.*, v. 14, p. 218.

### ORBIT.

**Allport, F.** Operative Procedure for Relief of Contracted Eye Sockets. *New York Med. Jour.*, v. 107, p. 484.

**Ochl.** Anatomy of Orbit. (12 ill.) *Nippon Gank. Zasshi*, Nov., 1917.

**Posey, W. C.** Results of Operation for Mucocoele of Frontal and Ethmoidal Cells. *Sec. on Ophth.*, *Coll. Phys.*, of Phila., Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 205.

### TUMORS.

**Hugger, C. C., and Forman, J.** Neuroblastoma of Retina. (4 ill.) *Amer. Jour. Ophth.*, v. 1, p. 234.

**Posey, W. C.** Sarcoma of Orbit. *Wills Hosp. Ophth. Soc.*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 201.

Adenoma of Orbit. *Wills Hosp. Ophth. Soc.*, Feb. 1918. *Penn. Med. Jour.*, v. 21, p. 482.

**Salterain, J. de.** Intraocular Sarcoma in Children. *Rev. Med. d. Uruguay*, v. 21, p. 1. *Jour. Amer. Med. Assn.*, v. 70, p. 1129.

**Satake.** Hemiangioendothelioma of Orbit. (1 ill., 1 col. pl.) *Nippon Gank. Zasshi*, Sept., 1917.

**Shoshi.** Metastatic Carcinoma of Choroid. (2 pl.) *Nippon Gank. Zasshi*, July, 1917.

**Stieren, E.** Epithelioma at Limbus. (3 ill.) *Pittsb. Ophth. Soc.*, Feb., 1918. *Amer. Jour. Ophth.*, v. 1, p. 278.

**Urayama.** Lymphoma of Tear Sac with Elephantiasis of Upper Lid. (2 ill.) *Nippon Gank. Zasshi*, Sept., 1917.

**Wible, E. E.** Rhabdomyoma. *Pittsb. Ophth. Soc.*, Feb. 4, 1918. *Penn. Med. Jour.*, v. 21, p. 481. *Amer. Jour. Ophth.*, v. 1, p. 277.

**Willetts, E. W.** Melanotic Sarcoma. *Pittsb. Ophth. Soc.*, Jan., 1918. *Penn. State Med. Jour.*, v. 21, p. 421.

### INJURIES.

**Brunetière and Amalric.** Severe Hemorrhage after Rupture of Sclera. *Clin. Opht.*, May, 1917. *Amer. Jour. Ophth.*, v. 1, p. 274.

**Durand.** Injury to Conjunctiva by Bursting of Large Projectile of War. *Rév. Internat. de Méd. et de Chir.*, 1917, v. 28, p. 104.

**Heckel, E. B.** Corneal Injury. *Pittsb. Ophth. Soc.*, Jan., 1918. *Penn. Med. Jour.*, v. 21, p. 421.

**Lapersonne, F. de.** Treatment of Intraocular Foreign Bodies. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 944.

**Parker, F. C.** Magnet Extraction. *Wills Hosp. Ophth. Soc.*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 203.  
Perforating Wound of Limbus. *Wills Hosp. Ophth. Soc.*, Feb., 1918. *Penn. Med. Jour.*, v. 21, p. 482.

**Stiltz, J. W.** Treatment of Eye Injuries. *Hahnem. Month.*, v. 53, p. 65.

**Tooke, F.** An Experience Through the Halifax Disaster. *Amer. Jour. Ophth.*, v. 1, p. 223.

**Wright, C. D'A.** Traumatic Anomalies of Lens. *Minnesota Med.*, v. 1, p. 135.

Repeated Titles. **Leplat** (v. 1, p. 79). *Amer. Jour. Ophth.*, v. 1, p. 274.

### PATHOLOGY.

**Barkan, H.** Ocular Defects in Mentally Retarded Children. *Calif. State Jour. Med.*, v. 16, p. 183.

### GENERAL DISEASES.

**Achard and Binet.** Reflexes due to Ocular Compression. *Lancet*, March 16, 1918, p. 409.

**Akatsuka.** Salvarsan and Neosalvarsan in Ocular Syphilis. *Nippon Gank. Zasshi*, Oct., 1917.

**Birch-Hirschfeld, G.** Ocular Symptoms in Disseminated Sclerosis. *Neurol. Zentralbl.* No. 17, 1917. *Brit. Jour. Ophth.*, v. 2, p. 237.

**Des Voeux, H. A.** Eye-strain and "Blephro-pathia." *Lancet*, March 2, 1918, p. 327.

**Dorlencourt, H.** Oculocardiac Reflex in Shock. *Paris Méd.*, v. 8, p. 130. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 1021.

Eye Strain and Epilepsy. *Lancet*, March 9, 1918, p. 378, 385.

**Masuda.** Ocular Syphilis. *Nippon Gank. Zasshi*, July, 1917.

- Rumsey, C. L.** Disturbances of Vision from Pelvic Disorders. *Jour. Amer. Inst. Homeop.*, v. 10, p. 1279.
- Shiosi.** Ocular Tuberculosis. (Ill.) *Nippon Gank. Zasshi*, Nov., Dec., 1917.
- Teal, F. T.** Eye in Dementia Precox. (Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 185.
- Verheyden.** Tuberculin in Eye Diseases. *Brit. Jour. Ophth.*, v. 2, p. 223.
- Zentmayer, W.** Ocular Lesions Resulting from Oral and Pharyngeal Disease. (Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 247.
- Repeated Titles. **Moret.** (v. 1, p. 221.) *Amer. Jour. Ophth.*, v. 1, p. 195.

#### HYGIENE.

- Prevention of Eye Injuries. *Amer. Jour. Ophth.*, v. 1, p. 284.
- School Lighting. *Brit. Jour. Ophth.*, v. 2, p. 230.
- Third Annual Report of National Committee for Prevention of Blindness. Pamphlet 14, New York, 1918.

#### OPHTHALMIC SOCIOLOGY AND HISTORY.

- Anderson, H. G.** Visual Requirements in Selection of Candidates for English Air Service. *Lancet*, March 16, 1918, p. 397.
- Brawley, F.** Ophthalmic Record in Chicago. *Amer. Jour. Ophth.*, v. 1, p. 206.
- Why Optometrists Should have a Medical Degree. *Bull. Federation of State Med. Boards*, Feb., 1918.
- Head Surgery Units. *Brit. Jour. Ophth.*, v. 2, p. 232.
- Jackson, E.** The Ophthalmic Year Book and Ophthalmic Literature. *Amer. Jour. Ophth.*, v. 1, p. 210.

- Kyle, J. J.** The Eye in War Time. *Med. Council*, v. 23, p. 299.
- National Congress of Medicine in Spain. *Arch. de Oft. Hisp.-Amer.*, v. 18, p. 55.
- National Ophthalmological Advisory Committee. *Brit. Jour. Ophth.*, v. 2, p. 229.
- Ophthalmic Journals. *Amer. Jour. Ophth.*, v. 1, p. 285.
- Reeducation and Future of War Blind. *Arch. de Oft. Hisp.-Amer.*, v. 18, p. 57.
- The Register of the Blind. *Lancet*, March 30, 1918, p. 476.
- Reporting of Accidents from Local Anesthesia. *Amer. Jour. Ophth.*, v. 1, p. 286.
- Right to Practice Optometry. *Med. Rec.*, April 6, 1918, p. 594.
- Risley, S. D.** Ophthalmology in Philadelphia. *Amer. Jour. Ophth.*, v. 1, p. 216.
- Santos Fernandez, J.** Voyage to Spain for Ophthalmic Purposes. *Cron. Med. Quir. de la Habana*, Feb., 1918.
- Schneideman, F. M.** Biographic Notices. *Amer. Jour. Ophth.*, v. 1, p. 292.
- Schools for Blind, Deaf and Defective Children. *Lancet*, March 16, 1918, p. 414.
- Science Versus Sensationalism. *Amer. Jour. Ophth.*, v. 1, p. 282.
- Uribe-Troncoso, M.** *Anales de Oftalmologia.* *Amer. Jour. Ophth.*, v. 1, p. 207.
- Würdemann, H. V.** Ophthalmology, 1904-1917. *Amer. Jour. Ophth.*, v. 1, p. 209.

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The Digest of the Literature, omitted from this issue, will be continued in the June number.



# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. I

JUNE, 1918

No. 6

## CONTRACTION OF PARETIC EXTERNAL RECTUS MUSCLE DIMINISHED WHEN MASSETERS ARE CONTRACTED IN ACT OF BITING.

P. N. K. SCHWENK, M.D., F.A.C.S., AND WM. CAMPBELL POSEY, M.D., F.A.C.S

PHILADELPHIA, PA.

This is a clinical report of a case twenty years after severe injury involving the cranial nerves, followed by regenerative changes, with a study by Dr. W. W. Watson, of the probable anatomy of the nerve tracts involved, and comments by Prof. Wm. G. Spiller on its neurologic aspects, with 5 illustrations.

J. S., aet 34, came to the Wills Eye Hospital March 6, 1918, for the correction of an ocular deformity arising 20 years previously as the result of a severe head injury. The accident to which he ascribed his symptoms was occasioned by a fall while carrying a heavy gas drum, in consequence of which his head was caught between the drum and the wooden floor. He was sent to the Altoona Hospital and was unconscious for a week or ten days. Two months after the injury he was able to return to his former occupation.

Immediately after the accident the patient noticed that the face was drawn to the right (left-sided paralysis), and that he could not chew with his teeth on the left side as well as he could on the right. The skin on the left side of the face was dead to the touch. He noticed some hardness of hearing, always aggravated by catching cold and occasionally had ringing in his left ear. Gradually the symmetry of his face was restored and the weakness observed in biting disappeared. Since the accident he has been employed at the same job and has been working regularly with only an occasional interruption for some minor illness.

The interest in the case from an ophthalmologic standpoint centers in the peculiar contraction of the left external

rectus muscle when the masseters are brought into play in the act of biting the teeth together. As may be noted in the accompanying illustrations, in primary fixation, the right eye fixes and the left is markedly convergent, i. e., about 45°. The lid of the affected eye droops, and this is due, not to a paresis of the levator, but, as Dr. Spiller has suggested, to a secondary contracture of the orbicularis, not unusual after paralysis of the facialis. In monocular fixation and in associated movements, it is only possible to rotate the left eye outwards and slightly beyond the median line, and the paresis of the left external rectus muscle seems complete. Synchronous, however, with a firm contraction of the masseters, the external rectus regains its power, contracts and rotates the eye outwards almost as though it had regained its normal stimulation.

We have all observed cases of associated movements between the eyelids and the eyeballs in conjunction with certain movements of the jaw, but all these were of congenital origin, and as far as I am aware, this case before us is unique in exhibiting this association as an acquired condition, apparently as the result of the head injury received years ago. Assuming that the phenomena could best be explained by

some peripheral union between the fifth and sixth nerves subsequent to the head injury, Dr. W. W. Watson kindly consulted anatomical authorities for us, and proffered the following explanation:



1. Looking straight ahead, showing drooping of left eye-lid and eye convergent.

First, that the muscles of mastication, viz., the masseter, buccinator, and temporal muscles are supplied by the anterior and smaller division of the inferior maxillary nerve.

That the inferior maxillary nerve is intimately connected with the otic ganglion (motor root).

That the otic ganglion through its sphenoidal filament communicates with the vidian nerve.

That the vidian nerve comprises the large superficial petrosal nerve (a motor branch of the facial nerve), and through this superficial petrosal the otic ganglion communicates with the sphenopalatine ganglion (motor).

That the sphenopalatine (Meckel's) ganglion sends an ascending branch to the cavernous sinus to communicate with the sixth nerve (Bock).

It seems possible, therefore to establish a communication by graphic plotting, from the inferior maxillary nerve through the otic ganglion, Meckel's ganglion, to the sixth nerve. See Fig. 5.

The case was submitted to Dr. W. G. Spiller, the well-known neurologist, for his opinion, and his letter is of such interest that we will quote it in full:

"In regard to your patient the following facts seem to me of importance: He received a severe head injury twenty years ago, following which he bled at the left ear, nose and mouth. He was unconscious for ten days, but was not paralyzed on either side of the body. The paralysis of the left external rectus occurred immediately after the injury; it was therefore not a congenital condition.



2. Looking straight ahead, with masseters acting; convergence of left eye not so marked as in Figure 1.

The left facial, the left acoustic, and the left trigeminal were paralyzed as well as the left abducens. The lesion probably was hemorrhage at the base of the brain. As the abducens is more

in the center of the base of the skull than the other nerves mentioned, it probably was most paralyzed by the hemorrhage. The trigeminal is at the side of the pons, passes over the petrous portion of the temporal bone, and therefore would be less affected in hemorrhage. It recovered its function more rapidly than the other affected nerves, and is the only one in which complete recovery has occurred. The lesion could not have been within the pons, because if it had been here it surely would have caused some weakness of the opposite side of the body, from implication of the pyramidal fibers, an intramedullary lesion could hardly have affected the four nerves mentioned without being a large one, as the trigeminal nerve is anterior to the other three, and so large a lesion

between the trigeminal and the ocular nerves the condition has been congenital, and the explanation of a double innervation, as for the trigeminal and the nucleus of the branch to the levator palpebræ, is satisfactory, but in the case we are considering the damage to the



3. Looking far to the left; right eye fixing, left markedly convergent.



4. Looking far to the left, with masseters acting. Convergence of left eye less marked than in Figure 2.

would be likely to cause weakness at least, in the opposite side of the body. We must conclude therefore that the lesion was extra-medullary, and this conclusion is important."

"In the various forms of associated movements reported in the literature

abducens was outside of the pons, and it is impossible to suppose that such a lesion almost completely destroyed the conduction of voluntary innervation and preserved that of associated movement. No explanation offered in the literature for the reported cases satisfies the demands of this case, the phenomenon must be dependent upon some arrangement peripheral to the lesion."

"It is common to find in peripheral facial palsy in which only partial recovery has occurred, contracture of the muscles about the mouth and spasmodic jerking of the lower part of the face about the mouth on the side of the palsy. If one observes carefully he will see that this spasmodic jerking is always in association with winking,



never occurs at a time when winking does not occur, and is an associated movement with the closure of the lids on the same side in winking. It is present only when there has been partial recovery, but the recovery must be incomplete. The explanation is that in regeneration some of the fibers from the central portion of the facial nerve intended for the upper branch lose their way and enter the lower branch, consequently the involuntary closure of

given by Dr. Watson, are in conformity with statements in books on anatomy, Gray's for example; but only in older editions of Gray's is the reference to Böck made. Meckel's ganglion sends fibers to the cavernous plexus. It also sends fibers through the sphenoidal fissure to the orbit, but it is not stated that the latter fibers communicate with the abducens. The abducens receives fibers from the cavernous plexus."



Fig. 5. Diagram of ganglia and nerve trunks to indicate association of contraction of abducens with contraction of masseter. The trunks and ganglia immediately in this motor tract are shown in black.

the lids through the action of the orbicularis palpebrarum sends some of the innervation to the lower branch with drawing up of the corner of the mouth."

"When the facial nerve is cut and an anastomosis is made between the peripheral end of the facial and the spinal accessory nerve, recovery results in associated movements. Attempt to move the face causes movement of the shoulder. This is another example of peripheral associated movement."

"The anatomic connections, as

"It is probable that the trigeminal nerve recovered fairly rapidly, before any regeneration occurred in the abducens. Some of the fibers from the third division may have wandered into Meckel's ganglion, and from here to the abducens. The route is circuitous, but it is largely in bony canals, and wandering nerve fibers of the trigeminal might take any course. As they approached the abducens they might have been attracted to it. The views of Balance and Stewart are no longer held in full by most investigators; but it is

probable that the neurilemma nuclei of the peripheral end of a degenerated nerve exert an influence on the young axis cylinders, growing from the central end. As probably no such axis cylinders were in the abducens nerve at the time of regeneration of the trigeminal nerve, the young axis cylinders of the trigeminal nerve if they approached the abducens nerve, probably would be attracted to it."

"When the man is looking as far as possible to the right at the time he bites, the left eye moves to the left but not so far as when he is trying to look to the left when he bites. The actual

excursion is much the same. When he is trying to look far to the left at the time he bites the pupil goes beyond the median line. This is against the theory of inhibition of the internal rectus at the time of biting. There are other objections to the theory of inhibition."

With a view to lessening the deformity occasioned by the squint, we purpose endeavoring to transfer some of the muscle activity from the superior and inferior rectus muscles by resecting some of the fibers of these muscles and transplanting them upon the external rectus muscle.

## DEEP X-RAY THERAPY IN THE TREATMENT OF TUMORS OF THE HYPOPHYSIS.

CLARENCE LOEB, A. M., M. D.

CHICAGO, ILL.

A review of previously recorded cases, with report of a case greatly benefited by this treatment, and comparison with a case relieved by operative treatment. Read before the American Academy of Ophthalmology and Oto-Laryngology, at Pittsburgh, October 29th, 1917.

Hypophyseal tumors manifest themselves by symptoms which are referable either to pressure, such as visual disturbances, or to interference with the endocrinal secretion, such as acromegaly, or by symptoms of a more general character such as headaches, dizziness, etc., which may be due to either pressure or secretory disturbances, or perhaps both. It is unnecessary to go into the details of these symptoms, as they are well known to all of you. I will merely mention that the characteristic ocular symptom is a bitemporal hemianopsia, caused by pressure posteriorly on the decussating fibers of the optic nerves. This is accompanied by more or less loss of central visual acuity, which in advanced cases causes a variation in the typical appearance of the fields. It very frequently happens that the visual disturbances are the first to cause the patient to consult a physician, and therefore the oculist may be the man to point to the correct diagnosis. But the correct diagnosis is

after all not the point which interests the patient most. What he consults us for is to obtain relief from distressing symptoms, and the question which arises is, "what have we to offer him in the form of relief or, better still, cure?"

If the disease is a local manifestation of a constitutional condition, for example syphilis, we have of course the recognized specific therapy. If, however, our tests for these conditions prove negative, and if an X-ray picture shows an enlargement of the sella turcica, so that we may safely assume the presence of a neoplastic growth or possibly a cyst, medicines may alleviate or mask the symptoms but will not influence the course of the lesion. We must have recourse to some other form of treatment.

Naturally the question of surgical intervention presents itself. This may be in the form of a decompression, which is after all merely a palliative measure. Or an attempt may be made to directly attack and remove the tu-

mor. There are various methods of approaching the hypophysis, but the best is probably the route suggested by Dr. Joseph Beck, namely the antrum-ethmoid-sphenoid route. However, it is not my purpose to discuss the various surgical methods, which are difficult, and not devoid of danger, as the rather high mortality shows. Because a method of treatment is dangerous is no argument against its employment in a condition which itself is more dangerous to function and even life, unless some alternative can be suggested which will accomplish results as good with less untoward possibili-

ties. Such an alternative I wish to present to you today by detailing the course of a case of hypophyseal tumor treated by deep X-ray therapy, which has been under my observation recently at the North Chicago Hospital.

Radiotherapy of intracranial tumors is not especially new. In the furor which greeted the news of the discovery of the Roentgen rays, and their exploitation as a panacea, their use in intracranial conditions could not be overlooked, especially as cranial surgery was then in its infancy. The usual number of marvelous results was announced, but sober second thought and a more careful scrutiny of cases caused the pendulum to swing in the oppo-

site direction, until the use of the X-rays was practically abandoned.

Contributing to its neglect was the fact that general surgeons, such as Cushing, McArthur and Eiselberg, and especially otologists, such as McKernon, Newman and Beck, showed that the brain under proper precautions was as safe for operative procedures as other parts of the body, such as the abdomen and thorax, which careful asepsis and improved technic had added to the domain of successful surgery. If success had invariably attended their efforts, and if it were always possible to persuade the patient to submit to an oper-

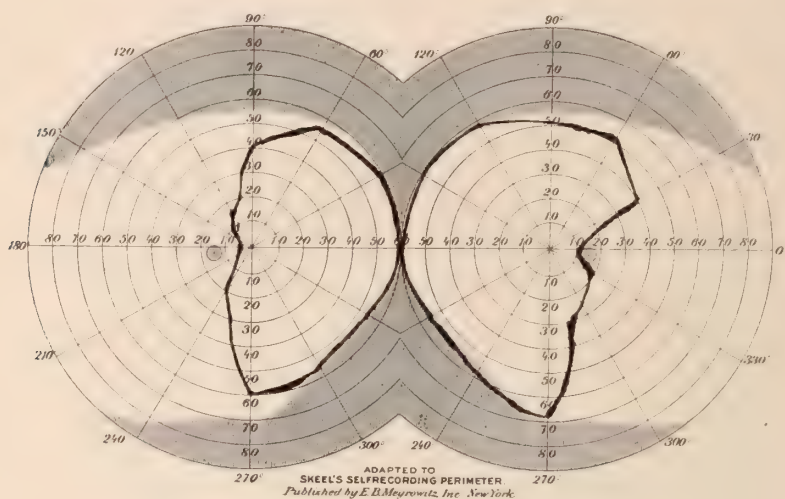


Fig. 1. Fields of vision Mrs. H., Aug. 8, 1917.

ation, "finis" might have been written to this chapter of surgery. As it is, we must welcome the fact that there is a possibility of a recrudescence of X-ray therapy for intracranial tumors, and must investigate carefully its claims to a place in our armamentarium.

In 1909 Gramegna<sup>1</sup> reported a case of acromegaly treated by X-rays in which he obtained a temporary improvement in the visual fields accompanied by a complete disappearance of the headaches. In spite of treatment, however, the case went on to a fatal termination. In 1913, Bécclère<sup>2</sup> reported four cases. The results of the treatment were as follows:

(a). Disappearance of headaches,



dizziness, nausea and vomiting. Distinct improvement in vision, including increase in the visual fields. Cessation of pathologic bony changes and restoration of the sexual function. The patient passed away from the direct observation of Bécélère, but the family physician reported that the patient was in good health five years after treatment.

(b). Improvement of visual fields, also central vision. However, some parts of the optic nerves had already undergone degeneration. The same after one year.

(c). Increase in the visual fields and central vision. Impotence less. The same after one year.

can be checked, but the organic lesions already established cannot be made to disappear. In the early stages of this form, X-ray therapy is indicated, but in the later, where the hyperfunction has given place to insufficiency of secretion, it is contraindicated.

Other men have used the X-ray in the treatment of hypophyseal tumors, and their results have been quite satisfactory.

Calamet<sup>3</sup> treated a case of typical pituitary tumor with radiotherapy with only temporary improvement. The ultimate outcome of the case is not given.

Terrien<sup>4</sup>, however, reports a case of his own where the improvement has lasted four years. He also refers to a

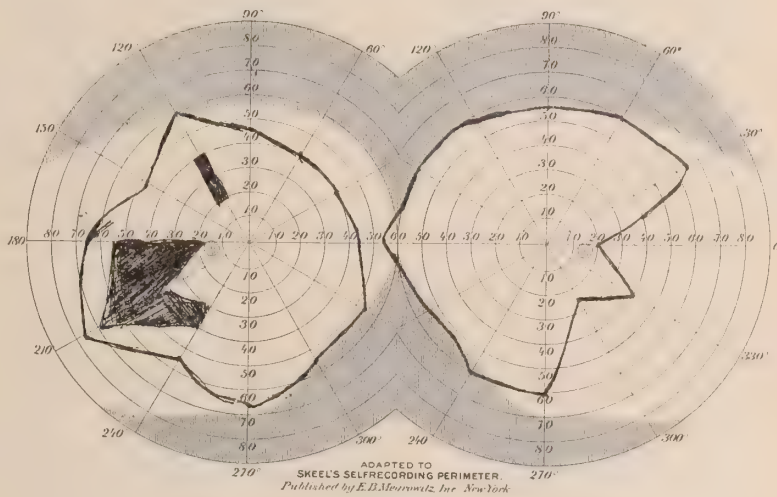


Fig. 2. Fields of vision, Aug. 22, 1917.

(d). Slight increase in visual fields and central vision, complete disappearance of headaches. Still under observation.

Bécélère's conclusions are that there are two classes of tumors from a symptomatic standpoint. First, those where the symptoms are due to compression, especially of the optic nerves. These cases are the most favorable for treatment, and the X-ray is useful in all stages, especially the early ones before atrophy of the nerves has developed. Second, those where the symptoms are especially manifest in the bony skeleton. In these, the abnormal growth

case of de Lapersonne when a distinct improvement took place in a case of acromegaly with disturbances in the visual field, headaches and enlargements of the sella turcica. Under radiotherapy these symptoms became very much ameliorated.

My own case is as follows:

Mrs. H., age 38, came complaining of headaches from which she had been suffering for 5 years. These varied in intensity but she was rarely free from them. In addition her sight had been getting bad for about the same length of time, and she had had many attacks of dizziness and nausea. When the

headaches first appeared, she had been examined for glasses on the theory that her headaches were ocular, but had been told that she did not need any. Since then she had not consulted a physician. For about the same length of time she had noticed that there was a change in her appearance, viz. that she had been getting fatter. Her face was larger, her hands were larger, and there had been an increase in the body fat. However, there had been no loss of hair on the body, nor any decrease in sexual instinct, although her menopause had set in about the same time, that is at the age of 32, just after the birth of

Nasal examination.—Large inferior turbinates on both sides, with hypertrophy of the whole mucous membrane. Very pronounced pyorrhea and calcarious deposits with diseased teeth. Lips large, tongue large. Highly reactive pharynx so that the pharyngeal structures can not be seen.

Examination of the eyes showed that the optic discs were paler than normal, but there was no actual atrophy. As the patient was illiterate and her mentality was somewhat low, either because of the disease or naturally, it was difficult to test her vision. However, it was determined to be  $1/8$  in each eye.



Fig. 3. Fields of vision, Sept. 19, 1917.

her youngest son. She had three children all alive and healthy, and her family history was negative. There had been no change in her voice. There was no increase in thirst. The test for sugar tolerance was defeated by the fact that the patient vomited when it was tried.

The physical examination of the patient showed the following: Height, 5 feet 4 inches; weight, 175 pounds. There is a general increase in the adipose tissue. The fingers taper. Thick lips and fat cheeks. Coarse features. Thyroid not palpable. All reflexes normal. Physical examination of heart and lungs negative. Blood pressure, maximum 110, minimum 80.

With a + 2. sph. lens, the central vision was  $6/20$  nearly. Taking of the visual fields was also difficult for the reasons mentioned above, and in addition because it was difficult to compel the patient to keep her eyes fixed on the central mark. However, it can be seen by the fields (see Fig. 1, page 398), that there is a distinct loss of the temporal fields, although not a complete loss. In addition there is some impairment of the nasal fields, especially the left. An X-ray picture of the patient's head indicated a decided increase in the area of the sella turcica as shown by the picture. A normal sella turcica is shown for comparison. Plate X.

The patient was referred to Dr.



FIG. 4.—X-RAY PICTURE OF MRS. H. SHOWING DISTORTED SELLA TURCICA.



FIG. 5.—X-RAY PICTURE SHOWING NORMAL SELLA TURCICA.





Eisen, Roentgenologist of the North Chicago Hospital, who carried out the treatment as outlined below. From time to time the patient reported to me for examination. I have never been able to see any change in the disc. Almost from the beginning there was an alleviation of the patient's headaches. They did not disappear entirely, but there were intervals of complete relief, with an occasional headache of less severity. Also she was able to sleep, either because of relief from pain, or improvement in her general condition. A field of vision taken August 8th showed practically normal nasal fields, but practically no change in the tem-

downward and outwards, and a small one upwards and outwards.

On September 5, vision was  $6/30 +$ . As it was a dark day, taking of the visual fields was postponed to the following day, but the patient did not return until September 19. She had no treatment for a week, and stated that she felt much worse for the last five days. Her headaches had returned, and her sight had grown worse. The vision was only  $1/6$ , and the visual fields were about the same as at the time of her first visit. On October 3, patient stated she still had occasional headache and some nausea, but her vision had increased to  $1/4$ .

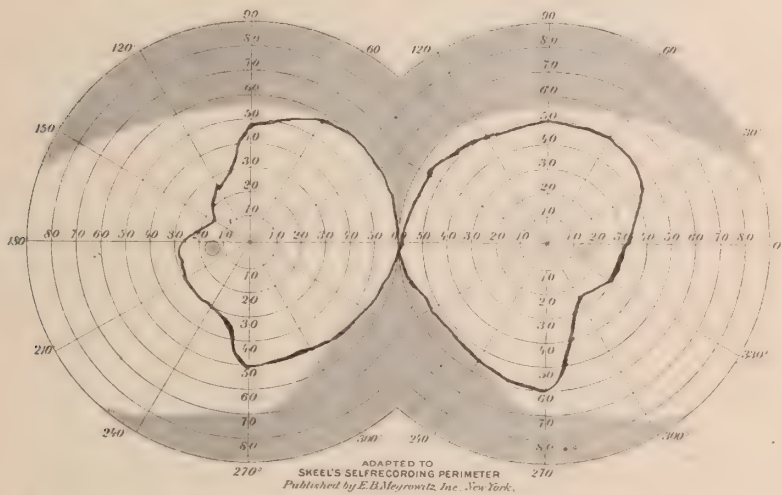


Fig. 6. Fields of vision, Oct. 17, 1917.

poral. Vision had increased to about  $1/6$  in each eye.

On August 22, the patient came to be examined in a very cheerful mood. She had been free from headaches for about two weeks except for a slight one the day before. Also she stated that she had been sleeping well, and that her sight was much better. The vision in each eye was  $6/30$ . The visual fields showed an astonishing improvement. The right showed a normal nasal field with improvement upward and slightly downward. The left showed some loss in the nasal field, but temporal field of about  $2/3$  normal extent. However, there is a scotoma of considerable size

October 8. Patient feels better, no headache. October 17. General condition still improving. Vision  $= 1/4$  in each eye. Visual field shows some improvement over the last time. Discs, unchanged. On the whole the improvement from an ocular standpoint has not kept pace with the improvement in headache and general feeling.

The treatment in this case is summarized as follows:

The places where the rays were applied were those closest to the hypophysis, i. e. over the right and left temple, right and left antrum, and nose. Between the tube and skin, an aluminum plate of one millimeter thickness

was interposed. The purpose of this was to cut out more of the "soft" rays, i. e. those of longer length, and concentrate the "hard" rays i. e. those of shorter wave length, which are less easily absorbed by the tissues overlying the hypophysis.

The applications were made until an erythema dose had been given, that is a dose sufficient to produce a slight redness of the skin. In the beginning this was given in four applications of five minutes each, in ten days to each area, covering the five mentioned areas in seven weeks. Lately the amount given is one-fifth less or

volts,  $3\frac{1}{2}$  amperes in primary, with mercury interrupter of 1,800 revolutions per minute; the tubes, water cooled and measuring twenty-seven inches from anode to kathode, and twelve inches from kathode to automatic "Queen" reducer.

In contrast to this case, I should like to mention the result in a case of cyst of the hypophysis, which I recently saw. The symptoms date from the age of 13, some 23 years ago, and consist of visual disturbances, lack of ambition, heavy smoking and drinking, headaches; skeletal, skin, and adipose changes. Vision decreased to complete

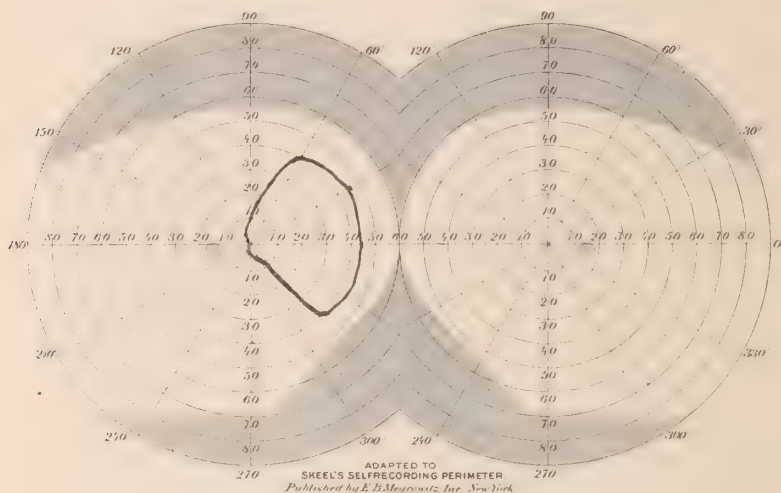


Fig. 7. Fields of vision in case of Dr. Jos. Beck before operation.

four minutes, reaching an erythema dose in two weeks, or ten weeks for all five areas. The reason for this reduction is a clinical one, namely the patient complained of nausea, dizziness, and prostration on the evening following the treatment. With the present amount these symptoms do not appear.

The skin-focus distance was eight inches. The equivalent spark gap of the tube varied from nine to fourteen inches, usually eleven inches. From  $3\frac{5}{8}$  milliamperes to  $1\frac{4}{5}$  milliamperes were passed for four to six minutes, producing in each treatment three to seven milliamperes-minutes. In all the patient has received 10 erythema doses. The generator is a 16-inch coil with 110

blindness in the right eye; with complete loss of the left temporal field, contracted left nasal field and great loss of central vision. Optic disc showed atrophy, and the X-ray picture showed enlargement of the sella turcica. An operation by Dr. Jos. Beck revealed the presence of a cyst of the hypophysis, which was opened and drained. Recovery was uneventful. Now, three years later, the patient presents himself with cure of headache, etc. The skeletal changes have persisted but have not increased. Disc pale. Vision: Right eye light perception, but inability to project. L. E.  $1/10$ , no increase with lenses. The visual field for the left eye showed almost complete loss



of the temporal field, but an increase in the nasal field to almost normal. The patient felt well, had good mentality, and on the whole was in a very satisfactory condition, considering how far the disease had progressed before the operation.

In conclusion, permit me to compare the relative merits of the surgical and X-ray treatments. Access to X-ray apparatus is as a rule easy, whereas operators able to attack the hypophysis region are not so very numerous. The patient, unless otherwise incapacitated is able to perform his daily occupation while under X-ray treatment. Patients

and this has been known to last for four years or more. Whether that means a cure can of course only be proven by a post-mortem. Decompression operations can do no better than that. Removal of the tumor may mean permanent cure, but this can always be held as a last resort in case the X-ray treatment fails. It seems to me that the logical course is first to try whether or not the X-ray treatment will prove of benefit. If the symptoms persist for a reasonable length of time, or if they become aggravated, then an operation becomes necessary, and this should be a direct attempt to remove the tumor

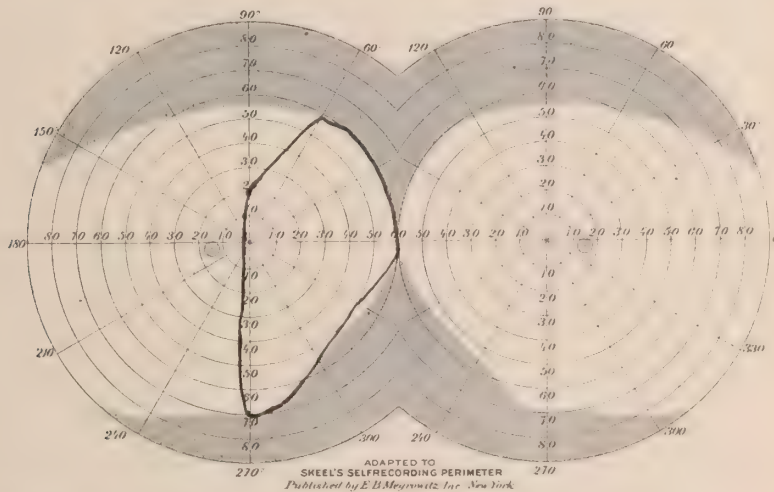


Fig. 8. Fields of vision in Dr. Beck's case 3 years after operation.

who refuse to undergo operation have in the X-ray a method of treatment which promises relief from symptoms,

if the patient is strong enough, otherwise a decompression followed later by extirpation of the tumor.

#### BIBLIOGRAPHY.

- (1) Gramegna—Case of Acromegaly Treated by Roentgen Rays. *Revue Neurologique*, 1909. Abst. by Bécclère.
- (2) Bécclère—Die Röntgenbehandlung der Hypophysengeschwülste, des Gigantismus und der Akromegalie. *Strahlentherapie*, Bd. III, 1913, p. 508. Read before the 4th Int. Congress of Physiotherapie, Berlin, 1913. *Ann. d'Ocul.* 141, p. 196.
- (3) Calamet C. F.—Bitemporal Hemianopsia from Tumor of Hypophysis. *Arch. d'Ophthalm.* v. 35, p. 103.
- (4) Terrien F. X-ray Treatment of Ocular Complications in Hypophyseal Disease. *Arch. d'Ophthalm.* v. 35 p. 257. Abst. *Annals of Ophthalm.*, 1917. p. 130.

# VERNAL CONJUNCTIVITIS GREATLY IMPROVED BY RADIUM TREATMENT.

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PHILADELPHIA, PA.

Report of a case under observation five years, failure of previous treatment, cure by adequate applications of radium. Review of experiences of others with this treatment. Read before the Section on Ophthalmology of the College of Physicians of Philadelphia, January 17, 1918.

Reports of the successful treatment of vernal conjunctivitis by applications of radium have been made, from time to time, since the element was first introduced to the medical profession, about 15 years ago, and I believe additional facts are of considerable value, when they give promise of relief in this intractable condition, which at times resists all forms of treatment. So I desire to place the following case on record.

F. L., an undersized boy of eleven years, came to the eye dispensary of the University Hospital, in the service of Dr. G. E. de Schweinitz, in November, 1912, for treatment of his lids, to which the parents' attention had been called because of their thickness, and because the child continually rubbed them, especially in warm weather. Examination showed a very pronounced case of vernal conjunctivitis, of the palpebral type. The surfaces of the conjunctiva of both upper lids were almost completely covered by large flattened masses, with distinct pedicles, between and under which a probe could be passed. The growths were hard and fibrous, and showed the typical bluish-white film on their surface, and the lids were thick and heavy. The ocular conjunctiva had a milky appearance, but there was no thickening at the limbus. Various mild antiseptic solutions were employed, with but little effect, though the child was most comfortable when a solution of boric acid containing adrenalin was used. Some of the masses were excised, and the lids were once thoroughly rolled, but without effect.

In July, 1913, he was sent to the Oncologic Hospital, which had a supply of radium, and applications of radium were made by Dr. Wm. E. Newcomet.

Eleven treatments of an hour's duration each, were given to the right eyelid, the amount employed being 11 mg. Six applications were made daily from July 13 to July 18, the radium being enclosed in an aluminum capsule, with a 1/10 mm. lead screen, all covered by a rubber cot. Five more were given daily between August 7 and 12. No reactions occurred, but no effect was apparently produced, except that the eyelashes fell out. These subsequently grew again, but are still very long and stiff, and fewer in number than usual.

The child attended the dispensary regularly at the University Hospital, and in July, 1915, he came with an abrasion of the right cornea, from rubbing the eyelids. This was followed by an ulceration and a faint opacity, which is still evident. The growths at no time disappeared during the colder months, but a gradual change was noted, in that they seemed to coalesce into a smaller number of very large masses, some of which measured 6 to 8 mm. in diameter. In February, 1917, it was decided to have radium treatment tried again, because of the successful results which had been reported by Dr. F. W. Shine in New York, and the boy was sent to Dr. Henry K. Pancoast, at the University Hospital, who had control of larger quantities of radium. The applications were made as follows, and I am indebted to Dr. Pancoast for permission to use his records:

February 16, 1917. Application of 35 mg. in 1/2 mm. aluminum capsule, directly to the upper lid, left eye, for 15 minutes. On February 20, a note was made that the eye was sore; slight superficial sloughing was present. March 9, no reaction remains. Condition is somewhat improved.

March 9. Application of 50 mg. in 1/mm. aluminum capsule to right upper lid, 15 min.

March 20, 35 mg. to left upper lid, 15 min.

April 21, 35 mg. to each lid, 15 min.

May 15, 50 mg. to left upper lid, 15 min.

May 22, 35 mg. to right upper lid, 15 min.

June 25, 40 mg. to each upper lid, 15 min.

This ended the radium treatments, five having been made to the left and four to the right, in a period of four months. The amount varied between 35 and 50 mg. and the time of exposure was 15 minutes, at each sitting. In November, 1917, he reported at the eye dispensary, and the growths were found to have completely disappeared. Except for a superficial roughening of the conjunctiva, due to scar tissue, the patient can be said to be cured, though he will be carefully watched for a recurrence during the warm weather. It was the most elaborate case of its type that I have seen, and the result obtained has been very gratifying.

One of the earliest recorded cases of the use of radium in vernal conjunctivitis was by Mackenzie Davidson and Arnold Lawson,<sup>1</sup> in a boy 12 years of age. Treatments were started in Feb., 1906; seven applications were made during a period of eleven months. From 29 to 44 mg. of radium were employed for about 15 minutes each time. The cure was complete. They noted that the immediate results were nil, except for a little redness, and some increase of photophobia and lacrimation for a day or two. The papules however seemed to melt gradually away, without any obvious alteration in their contour or appearance, whilst so doing. The improvement in the lessening of the irritability of the eyes began to manifest itself within six weeks of the commencement of the treatment. There was no recurrence after a year. Their experience taught them to prefer a few sittings, with a large dose, to more frequent sittings with a weak dose; the length of the sitting would

not make up for the weakness of the dose.

In 1909 Shine<sup>2</sup> showed a case of spring catarrh which he had treated with radium, with a favorable result. Sixty mg. of radium were employed for a period of five minutes, and the treatment was repeated eight times during eight weeks. The conjunctiva became entirely smooth, and the patient was free from discomfort.

Schnaudigel<sup>3</sup> in 1912 secured healing in a 16 year old girl by the use of radium in 10 mg. doses, applied for 25-30 minutes, in treatments which lasted over a period of 16 months. The patient had been treated for five years by other methods without improvement.

F. W. Shine<sup>4</sup> showed another case before the Academy of Medicine in New York, October, 1916. Three applications of 20 mg. for 25-35 minutes, in intervals of two weeks, had caused disappearance of the growths on the lid treated, whereas the other lid remained the same. He said that he had treated four other cases with radium. Two were pronounced cured after two applications of 60 mg. for 15 minutes; one case required four applications to relieve it. All the cases had been followed, and were doing well; he had never noticed any irritation or inflammation of the cornea, after the radium applications, the precaution being taken to protect it, in each instance by a metal disc.

Harrison Butler<sup>5</sup> reported two cases in 1917, one of which was treated with 45 mg. of radium bromide. Two applications of four minutes each, to the eyelids, were sufficient to completely cure the condition. The second case was treated with 7 mg. and five applications, of from 8 to 15 minutes were necessary, before a good result was obtained. One application was made to a plaque situated on each side of the upper limbus. The cure was not so prompt as in the first case when the quantity used was larger. He quotes Mackenzie Davidson, who has treated a number of cases with radium, as follows: "I can say that all the cases, without exception, which I have treated with radium, have been cured com-



pletely without leaving cicatrices; in some cases a certain degree of irritation has remained, though the characteristic aspect of spring catarrh has never reappeared, and I consider radium as the specific for spring catarrh."

Frank Allport<sup>6</sup> of Chicago has reported a number of cases successfully treated with X-ray, but recently writes that he is now having one treated with radium by Dr. Pusey. No report of the result was made in the article.

In conclusion, therefore, I think we may say that radium may be considered a very valuable aid in curing these cases of vernal conjunctivitis, of the palpebral type, which have resisted other treatment, and the general experience has been that occasional applications of large doses—preferably 25-35 mg., for periods of 15 minutes, at intervals of two to four weeks are most efficacious, and that reactive inflamma-

tions may be prevented by suitable protection of the adjoining parts.

Since reporting the above case, three other patients have been placed under treatment with radium by Dr. Pancoast, at the University Hospital. All were refractory cases, which had been treated elsewhere for years, and showed very marked development of the disease in the upper eyelids. The results will be reported later. So far we have not treated any of the cases of the limbus type.

The method of application is to evert the upper lid by a pair of forceps, which are held to the forehead by an adhesive strip. The radium in a suitable clamp, is then applied to the exposed conjunctiva, and watched by a nurse, until the expiration of the time of exposure directed by the physician in charge.

#### BIBLIOGRAPHY.

1. Mackenzie Davidson and Lawson. Transactions Ophthal. Society, United Kingdom, 1909.
2. Shine. Section on Ophth. New York Academy of Medicine, Arch. of Ophth., v. 39, p. 145.
3. Schnaudigel. Klin. Monatsbl. f. Augenh., 1912, ii, p. 620.
4. Shine. Arch of Ophth., v. 46, p. 67.
5. Harrison Butler. British Jour. Ophth., v. 1, p. 411.
6. Allport. Ophth. Rec., v. 26, p. 395.

## BLOCKING OF MACULAR ARTERIOLES AS A CAUSE OF CENTRAL AND PARACENTRAL SCOTOMA OF THE MACULAR BUNDLE TYPE.

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Report of two cases with discussion of this probable etiology and comparison of methods of taking the field of vision in such cases.

The classical picture of blocking of the central artery of the retina is familiar; the edema, giving the hazy white appearance to the retina; the cherry red spot at the macula; the almost complete disappearance of the arteries with the later appearance of "blood beads" in them; dilated pupil, if the good eye is covered; blindness, coming suddenly; all of these have attracted attention. The later aspects of the case are not so familiar and it is the appearance of the disc and the blood vessels which gives the clue to

what has happened and not the appearance of the retina, although there may be a faint cloudiness of this nerve tissue.

If a branch of the artery is affected, the signs and symptoms are much the same but limited in area. It is surprising to note how quickly the edema clears, how infrequently the "blood beads" come to notice; and after a month or two, how difficult it is to say what has happened unless one has followed the case from the early days. Hemorrhages sometimes occur, cer-

tainly in the branch obstructions. After a month, there may be no sign of trouble to the examining eye but a faint cloudiness and a few white dots, and perhaps, some changes in the contour

All authorities agree that once the inner layers of the retina are deprived of their blood supply for a time, they are destroyed as far as function is concerned and a scotoma is the result. The outer layers seem to derive their blood supply from the choroidal circulation and are not affected as a rule in this type of trouble.

The scotoma of the average block of a branch of the central artery is characteristically wedge shaped, as would be anticipated. But we are not especially interested in this form of trouble but in a centrally located defect, of very limited area but much more serious in its effects as far as vision is concerned because near the macula. These para-central defects are undoubtedly noticed and called to our attention in most cases; but a peripheral vascular block of the same dimensions would most likely pass unnoticed. The fineness of the vessels about the disc is not the only reason to be considered in deciding the question of frequency.

The form of the defect and its location will, with the history, help to decide whether the scotoma is due to a nerve lesion or not; because in the absence of local signs, we must come to such conclusion, otherwise. The perimeter is an excellent instrument to get the outline of the fields but is not adapted to accurate outlining of central defects and in many cases, we miss them entirely. The recording field of the usual perimeter is compressed about twelve times and as the travel of

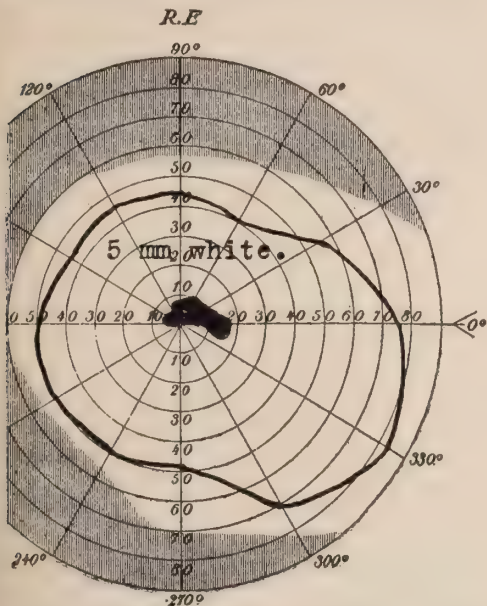


Fig. 1. Field of vision in blocking of macular arteriole (Lloyd's case) taken on perimeter with 5 mm. test object.

or appearance of the affected vessel, but if it be a small one there is very little to depend upon.

If one sees such a case late, after most of the resulting changes have already taken place, it is quite a difficult problem because the disc changes are absent and the alteration in a single small vessel will hardly be noticeable.



Fig. 2. The same field taken on Campimeter, with 3 mm. test object.

the test disc for ten degrees on the arc is actually about two inches, the space reserved for such recording is about 1/6th inch. A ten degree scotoma is certainly a fair sized defect. Early in these cases, the fixation point is involved and any monocular device will fail, lacking the certainty and accuracy of the binocular method.

The Haitz Charts are admirable but have too limited a field, covering only ten degrees each way from the fixation point. To get the blind spot (or disc area), the patient is supposed to look at the extreme side of the card but it has not been satisfactory. The Haitz

tient and examiner may be seated and the unavoidable motion which goes with the hand stereoscope is eliminated. The slate has been used on several cases of the type under discussion with results which the reader may judge of.

Mr. P. uses the microscope in his teaching and found one day that the eye usually employed did not give the customary results. His vision tested out for the right, the affected eye, 15/40 minus two letters and no improvement. The other eye was practically normal. The vitreous of the right eye contained a few moderately fine opacities but

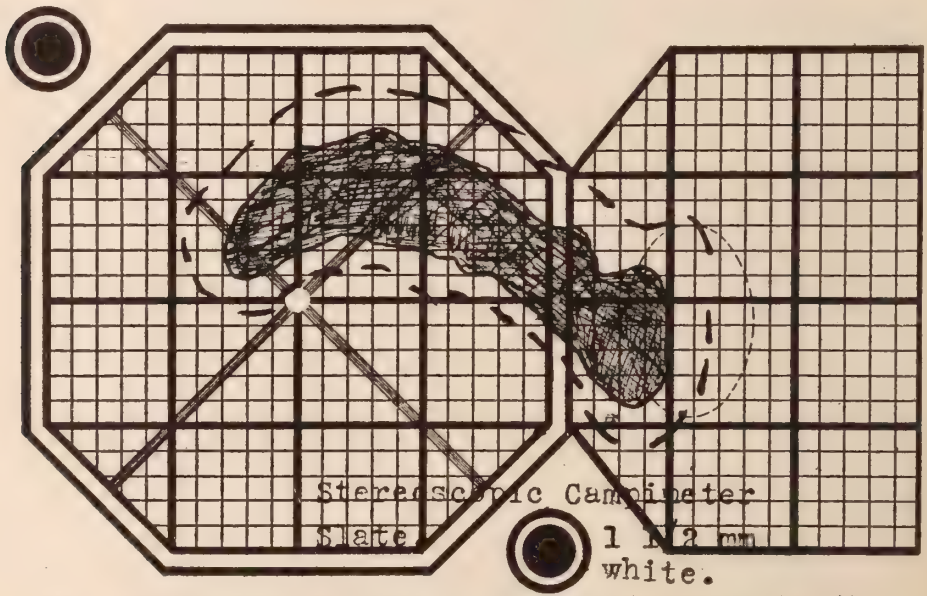


Fig. 3. The same field as 1 and 2 taken on Lloyd's Stereoscopic campimeter slate with 1 1/2 mm. test object.

Charts are made of paper and the examiner must count squares in order to locate on the record sheet, the various points which go to make up the outline of the defect. This consumes time at the expense of the patient's fixing power and the human eye is not habituated to remaining fixed upon one point long.

The Campimeter Slate avoids these defects and with the wide angle of view the necessary area is easily included without color aberration, which is so fatal to color testing. The stereoscope used rests upon the table and the pa-

there was none in the other. Direct ophthalmoscopy revealed a cloudy zone which ran in a graceful curve from the disc toward the macula, with the convexity downward, growing less noticeable as it approached the latter point where, to the examining eye, all was normal. Just short of the macula, there are a few white dots. The arteries of both eyes are of the silver wire type and the inner disc margins are "soft."

Sixteen months prior to this, the patient had cut his right leg, posteriorly, upon a broken bottle while bathing at



one of the city beaches. This was followed by a prolonged and profuse supuration, which healed, leaving a leg which is swollen from the knee down and pits on pressure. This leg has been baked and massaged a great deal to lessen the swelling and pain which results after standing for some time. He had also, a number of nasal polypi which were removed. The blur seemed to him to be above the object looked at and involving it, and the defect was mapped out on the slate and showed

now just outside of the "zone of doubt."

Three months later his vision is 15/15 minus a letter or two and there is nothing to be seen except two or three white dots and a very faint cloud near the disc. No doubt even these faint signs will soon disappear and as the artery blocked fades out or disappears in such a way that it will not attract attention, we will soon have nothing but the history and the character of the defect to guide an examiner who is not familiar with the case.

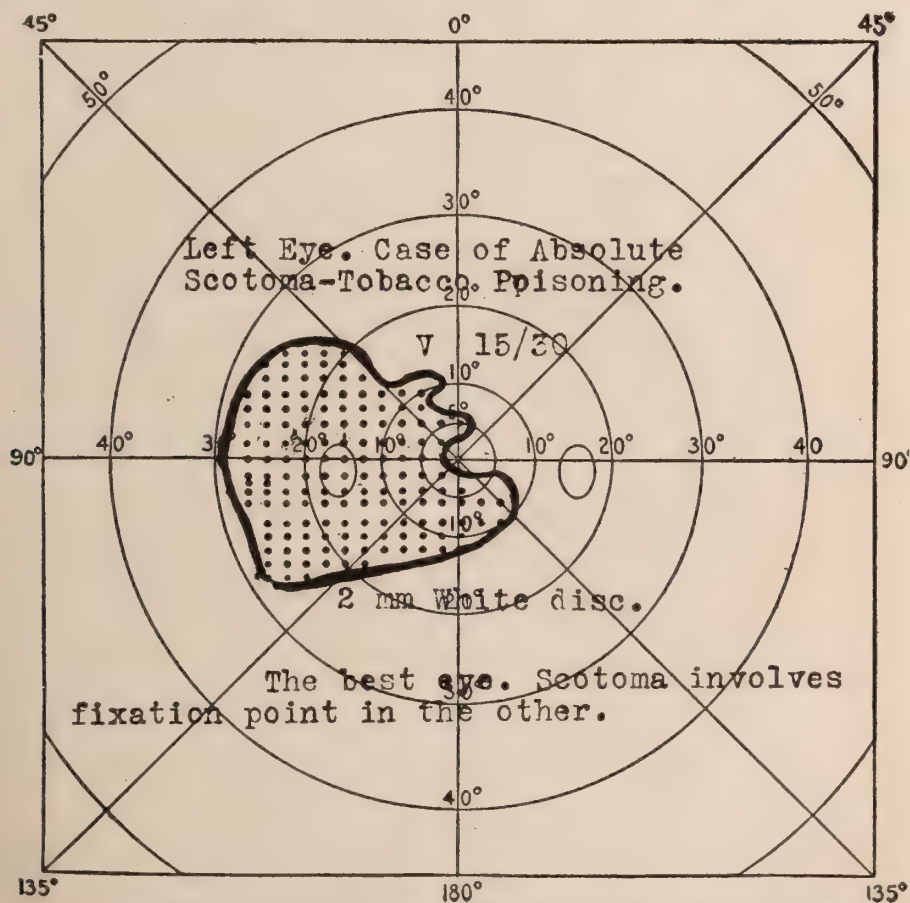


Fig. 4. Central scotoma for white in tobacco amblyopia taken on campimeter with 2 mm. disc.

the macular area included. Five weeks later, the cloudy area has decreased in size especially toward the macula and there are a few white spots remaining. His vision has improved to 15/20 minus four letters. The defect was again mapped out and the fixation point is

After the fixation point was free, the defect was outlined upon the perimeter, the Peter Campimeter and Campimeter Slate and these are submitted. (Figs. 1, 2 and 3.) If the slate record is reversed and turned upside down and looked at against a good light; the defect occu-

pies the exact position which the cloudy area originally occupied when viewed by direct ophthalmoscopy. This corresponds with the area supplied by the Inferior Macular Artery.

The macula is said to be without arteries, and that probably accounts for the shape of these defects as they avoid the fixation point after the edema has cleared.

The wavy outline is what one would expect if a slender vessel was occluded.

an enlarged blind spot and a small central scotoma, both relative, and for red, which merge, producing the classical oval defect including both fixation point and blind spot and becoming a defect for white, only if the patient continues his vicious habits. There is frequently a minute central absolute scotoma for colors and sometimes for white, but special means are necessary to demonstrate this.

In contrast with this, is the unilat-

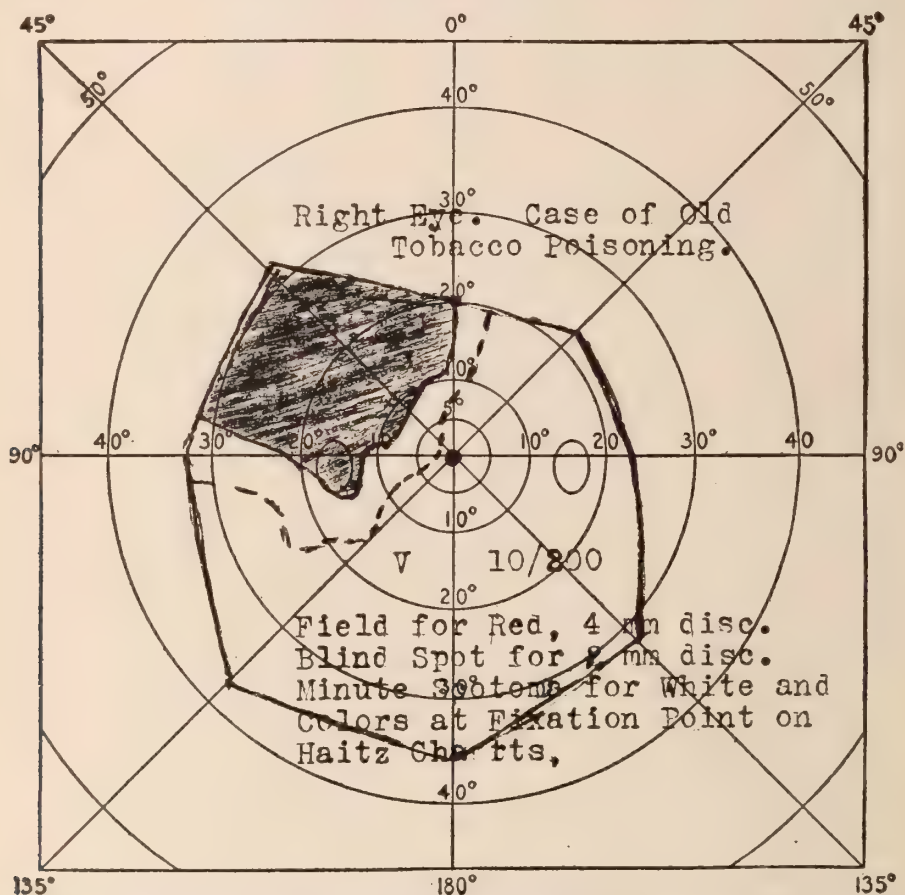


Fig. 5. Field and scotoma for red in tobacco amblyopia taken on campimeter with 4 mm. disc for field; 2 mm. disc for blind spot.

The scotoma is absolute for white and colors. It is almost certain to be unilateral.

Tobacco and alcohol scotomas are bilateral and there has come to my attention only one case reported as unilateral and that was a recurrence. The tobacco and alcohol scotoma begins as

eral, absolute and suddenly appearing scotoma for white and colors, branching from the blind spot and curling about the macula. Choroidal and chorio-retinal defects need not be discussed here because there is evident to the examining eye an excellent reason for the poor vision.

Old tobacco and alcohol cases, which have gone on to the stage of a defect for white, do not give an outline like the vascular blocks of a slender vessel and are bilateral, although one eye is usually much better than the other. (See Fig. 4.) Old cases which have

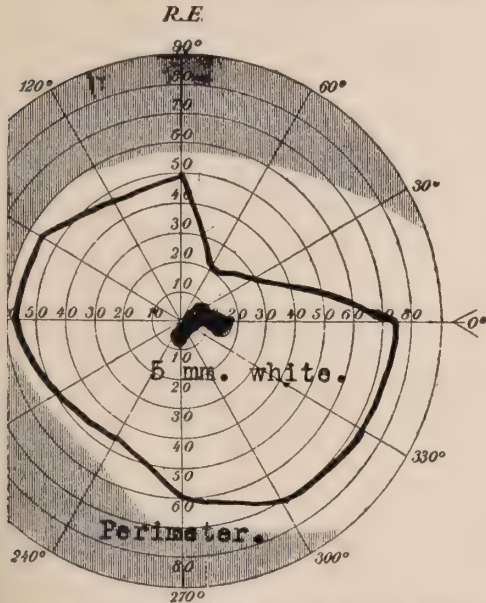


Fig. 6. Field of vision in old case of probable blocking of macular arteriole, taken with perimeter, with 5 mm. test object.

resumed their habits when half recovered have enlarged blind spots for red and perhaps a minute central scotoma, either for red or white. (See Fig. 5.)

Sphenoidal disease may be unilateral but the vision is early affected because the macular bundle is involved. This would be comparable to the early stage

of vascular block when there would be some evidences locally. The scotoma in sphenoidal disease begins with loss of red and green sense centrally. Every case of central scotoma or nerve disease should call for sinus examination.

The scotoma of glaucoma arching from the blind spot toward the fixation point does not in my humble opinion come on early. There is usually plenty of other evidence presented to the examining eye and the tonometer as well.

One other disease should always come to our minds when central vision is discussed and that is multiple sclerosis. The history of vision coming and going suddenly with obscure nerve signs, at first; with a central bilateral scotoma later; nystagmus, slurring speech and involvement of hands or lower extremities, should clear up the question. The field narrows and eye muscles are apt to be affected, but the pupil usually escapes. Hereditary optic nerve disease usually begins with a central scotoma for colors, red; is bilateral and after the field has narrowed, the patient is left with an island of useful retina external to the fixing area.

In contrast with the type of case presented previously, is another which comes seven years after the blur suddenly appeared. The patient complains of a blur before the right eye. With the left positively excluded, she can read nearly all the letters of the 15/15 line by turning the head and viewing the test chart from various angles and taking plenty of time. The other eye gives a 15/10 result. The macular



Fig. 7. Central portion of same field as Fig. 6 taken on campimeter with 3 mm. test object.



area of the affected eye is redder than the unaffected eye. The veins of both eyes have an occasional white strip along the border and when pressure is applied to the eyeball, the arteries jump.

The defect was outlined upon the slate and the typical result obtained. The record obtained on the perimeter

traits of these defects may be observed on this record as on the previous, and although a recognition of its type does not lead to restoration of vision, a correct diagnosis is certainly desirable. It would seem reasonable to say that to the usually accepted conditions which produce central or paracentral scotoma—toxic neuritis, sphenoidal disease, mul-

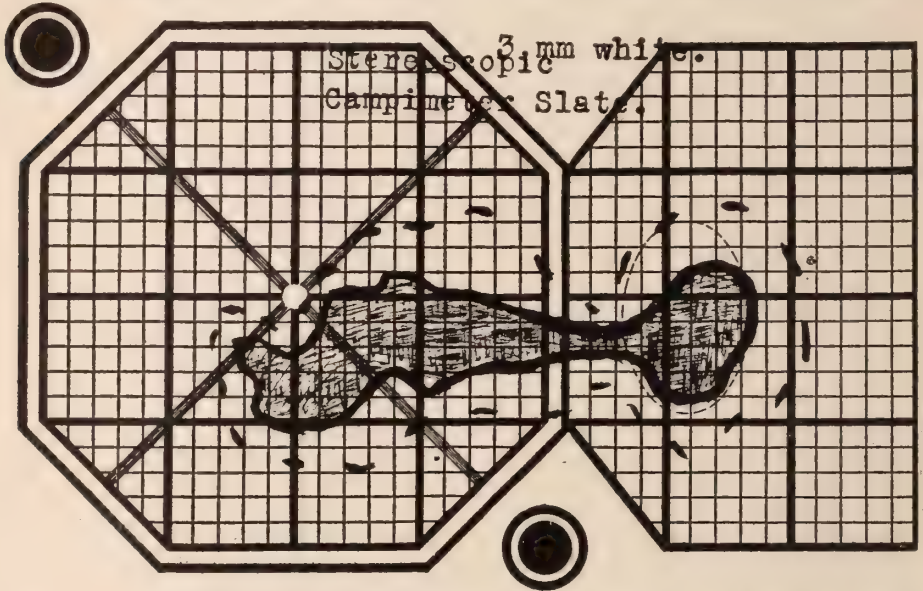


Fig. 8. Same field as Figs. 5 and 6 taken on Lloyd's campimeter slate with 3 mm. test object.

and the Peter Campimeter is also submitted. (Fig. 8.)

There is no minute central scotoma for white or colors obtained by the special Haitz Charts designed for testing this area, thus confirming the fact that the fixation point is fairly free. The

multiple sclerosis, hereditary neuritis, and glaucoma—conditions for the recognition of which we must exclude visible causes of a scotoma located near the macula or disc (except perhaps the glaucoma scotoma), we should add Blocked Macular Arterioles.

## THE MAGNET EXTRACTION OF FOREIGN BODIES FROM THE EYEBALL.

FRANK ALLPORT, M. D., F. A. C. S.

CHICAGO, ILL.

A critical review of the subject based upon the following papers which appeared in the British Journal of Ophthalmology, January, 1917: 1. "The Removal of Foreign Bodies by Means of a Giant Magnet" by G. H. Pooley, F. R. C. S. of Sheffield. 2. "The Technique of the Haab and Small Magnets in the Extraction of Intraocular Foreign Bodies," by Maurice H. Whiting, Captain R. A. M. C., and Charles Goulden, Lieutenant, R. A. M. C. 3. "The Ring Magnet," by T. Harrison Butler, M. D., Leamington, England.

Concerning "The Ring Magnet," the writer has had no experience, and this statement is probably true of most sur-

geons in this country. The enormous attractive power of this magnet is unquestioned, but the exercise of such

power is seldom necessary, and can easily become dangerous in inexperienced or careless hands. This instrument is, however, so constructed that its force can be graduated, so that it may be as mild as an ordinary hand magnet. It is so swung that it can gently encircle the patient's head as he lies upon the table. Butler has devised some hand spatulas that he connects with the magnet and introduces into the eye, for the purpose of searching for, and withdrawing steel fragments. This procedure may be justified in operations performed through the cornea—where the steel is visible, and where accuracy of contact is possible. Its justifiability, however, in posterior chamber work, where the operation is done through the sclera, may be doubted, in spite of the writings of some authors. In such operations the steel is not visible and its exact location is not certain; neither have manipulations under ophthalmoscopic guidance proven successful. Under such circumstances, the uncertain and experimental introduction of instruments, such as points, spatulas, scissors, etc., into the vitreous chamber, not only may carry infection, but may also produce undesirable or destructive traumatic results. The writer is firmly convinced that magnet points of any nature should never be introduced into the vitreous chamber any further than the lips of the scleral opening. If a powerful magnet, such as a Ring, Haab or Victor, will not dislodge and deliver a steel fragment, by long patient contact with the scleral wound, and the violent and repeated switching on and off of the current, the writer believes it is better to desist and proceed no further. Under such circumstances the steel is either behind the scleral wall—where it will probably do no harm,—or so firmly embedded in the sclera as to be practically beyond magnetic power to remove, and may become covered with exudate and not extremely dangerous, or (if it is an old case) so completely tied down by exudative bands as to render its removal improbable and perhaps dangerous. Most cases de-

mand enucleation, if the steel is surely inside the eyeball and cannot be withdrawn by a magnet, but if the operator intends to try to save the eye, at all hazards, the writer believes it would be best *not* to introduce magnet points, inside the eyeball. The writer does not wish to be misunderstood. He believes that steel fragments should always be removed, where it is possible to do so without resorting to procedures that may be even more dangerous than to leave the steel in situ. He believes that intraocular manipulations in the vitreous chamber constitute such a menace, and while such procedures doubtless have produced good results, it is his opinion that they are too dangerous to be adopted as a recognized feature in difficult steel operations.

The warning of Butler, not to forget that there may be more than one fragment in the eye, should not be forgotten, although such instances are extremely rare. The writer remembers one case, where four small pieces were removed at one time. Such pieces are usually attracted to the magnet at the same time, and come out at the same time. It is the writer's belief that they enter the eye as one piece and break up into two or more pieces after they are inside the eyeball.

Whiting and Goulden, in their article, lay down the sensible rule that either corneal or scleral wounds, after they are healed, should be disregarded in the removal operation. The operator should then select the most advantageous point for the incision. If, however, the wound is still open, the avenue of entrance should be selected, even if it has to be somewhat enlarged. If the splinter has entered by way of the cornea, it has probably badly injured the iris and lens, and but little additional harm can be done in the unhealed case, by withdrawing it, through the unhealed avenue of entrance. This is not always true, however, for the writer has seen two cases where a minute speck of steel has passed through the cornea, iris and lens, without producing a cataract or other serious damage. These steel specks were removed by



the scleral route and excellent results obtained. Other surgeons have seen similar cases. This naturally brings up the important subject as to what method shall be adopted in the withdrawal of steel fragments from the interior of the eye, or to put it more bluntly, shall such fragments be removed through the cornea or through the sclera. Whiting and Goulden still adhere to the teachings of Haab, who has always advocated the corneal route in almost, if not quite all, cases. It seems to the writer that it is time to become emancipated from such arbitrary rules as enunciated by Haab. No one holds Haab in greater respect than the writer, but it seems to him a great mistake to insist upon drawing a foreign body from the vitreous chamber to the cornea, when it can be much more easily and (he believes) much more safely removed by an opening in the sclera. The writer advocates the following rules:

1st. In the recent injury, where wound healing has not yet occurred, the steel should be removed through the original opening, whether this is in the cornea or in the sclera.

2nd. When the wound has healed, and the steel is in the lens, or anterior to the lens, it should be removed through the cornea.

3rd. Where the wound has healed and the steel is in the vitreous chamber, it should be removed through the sclera.

Concerning the first of these rules, where the steel is withdrawn through the as yet unhealed avenue of entrance, the writer believes that this wound will usually have to be enlarged, as a steel particle will rarely come out of a hole of the same size as it went in. He believes that steel fragments usually fly with their long axis directed toward the eye and enter with such force as not to tear the cornea or sclera very much beyond the limits of their width. When they come out, however, they may emerge broadsides, or at all events, need a larger aperture than the wound of entrance.

If the steel entered by way of the cornea, the parts should be placed in as

good surgical condition as possible after the removal of the foreign body. Corneal and iris fragments should be smoothly cut away, and if traumatic cataract is present, as much of it as possible should be removed by gentle expression and irrigation. Exudates should be removed, either with forceps or by irrigation. If some collapse of the globe has occurred, the eye may be filled with warm sterile salt solution, as a substitute for the normal intra-ocular liquids. It must always be remembered, however, that cases of severe steel injuries, with large lacerations, iris prolapse, partially collapsed globes, etc., usually proceed promptly to develop panophthalmitis and terminate in enucleation. In the light of experience, the writer believes that eyeballs thus severely wounded are hardly worth a magnet operation, and are perhaps better enucleated at the start. Even if the globe is saved, it is usually unsightly, blind and dangerous, and it is a grave question whether an enucleation, a short illness and a speedy return to work is not, after all, the best course to pursue. Of course, the location and *extent* of the injury will play a conspicuous part in the advice given, as will also the hope that perhaps some sight may be saved, or at least that a presentable globe may be salvaged out of the disaster. Besides this—the patient and his friends will have to be consulted and the surgeon will be compelled to recognize that eyes, sightless or otherwise, are precious things and are not to be sacrificed, except as a last resort. If the, as yet unhealed wound, is in the sclera, the tear should be carefully cleaned of all tissue fragments after the steel has been removed. Salt solution may be injected to fill out a partially collapsed globe, after which the conjunctiva, but not the sclera, should be sutured. Whiting and Goulden advocate suturing the sclera, but the writer feels that this is a mistake because considerable force is necessary to suture the sclera, and besides this, when the sclera is sutured a thread is necessarily left inside the eyeball, which may not be aseptic, and certainly when it is removed, infection



may be drawn into the vitreous chamber.

As has been said, Whiting and Goulden strongly advocate the almost universal removal of steel through the cornea, according to the teachings of Haab, even when the steel is in the vitreous and the cornea is healed. The writer has already admitted the advisability of removing steel through the cornea when the fragment is in the lens, or anterior to the lens, but he believes that the scleral route should be chosen when such foreign bodies are in the vitreous chamber. Haab's procedure consists, briefly, in coaxing the splinter along the floor of the vitreous chamber through the suspensory ligament, into the posterior chamber, up the posterior wall of the iris, through the pupil, down to the floor of the anterior chamber and out through a corneal incision. Angling of this nature is not impossible; the writer has done it, and has seen it done, but he contends that it is difficult, and sometimes impossible to do without serious complications, and that the scleral route is much simpler and safer. As Pooley says in his article, Haab assumes that most foreign bodies are spindle shaped, small and smooth. The writer's experience is quite to the contrary, and so, evidently, is that of Pooley. The writer sees very few foreign bodies of this shape. Most of them are long, narrow and jagged, and this roughness is one of the reasons why the writer is so emphatically in favor of removing foreign bodies through the sclera, when it is possible to do so, for he is confident that dragging a sharp, pointed foreign body over the ciliary processes, the iris, the cornea, etc., must be much more dangerous than to remove it by the scleral route. The writer cannot, however, agree with Pooley that most of these foreign bodies turn broadside upon entering the eye. The writer thinks that most of them enter the eye in the direction of their long axis because most wounds show, by the narrowness of the aperture, that the fragment has entered the eye, not broadside, but in the direction of the long, narrow axis.

The writer is quite willing to agree with Pooley, that many particles of steel that enter the eye come fresh from the fire and are more or less aseptic, but it is not well to count upon this, and the writer certainly does not agree with him that it is just as well to wait a few days before removing the foreign body. The writer is quite confident, in his own mind, that the sooner foreign bodies are removed, the better. The mere fact that foreign bodies remain in the eye for a long time and are then removed, and the preservation of a good eye is maintained, is really no argument. This merely demonstrates that such things can happen. It does not demonstrate that it is wise or safe to wait any longer than is absolutely necessary before the foreign body is removed.

Pooley is quite right when he says that it is unwise to make any effort to remove the foreign body before its situation has been localized. Of course, cases are seen from time to time where the foreign body can be localized by a careful inspection of the eye—inside and out—with the ophthalmoscope, the transilluminator, etc., but as a rule it is better to have the foreign body localized so that the surgeon can know exactly where to look for it. Sweet's and other localizers are extremely useful for exact localization, but as a rule, a good front view X-ray picture and a good profile picture enables one to localize a foreign body with sufficient accuracy for all practical purposes, and ordinarily the time need not be taken for any more specific localization. Speed in removal is a decided factor in success, and in the preservation of eyeballs and sight, and the writer warmly advocates speed in X-ray pictures and in the subsequent removal of the foreign body. It stands to reason that the less time an eye is invaded by a piece of steel, which may or may not be septic, the greater the chance of a good result.

The writer quite agrees with Pooley that we should not use, what he terms a "trial pull" to ascertain the existence of a foreign body. Operators sometimes diagnose a foreign body in the eye by means of the external applica-

tion of the magnet instead of depending upon the X-ray. There can be no question as to the inadvisability of a procedure of this kind, for of course, when the magnet has approached the eye, the sharp, jagged steel is quite likely to be pulled up against the side of the eye, thus perhaps, invading the retina, the choroid, the ciliary processes, the lens, the iris, the anterior chamber and the cornea. The quieter a foreign body is kept when inside of the eye, the better, and it is strongly urged that in all suspected cases, the immediate use of the X-ray be resorted to for the diagnosis of the foreign body and its localization; and that this should be followed by its speedy withdrawal by the magnet. The writer cannot agree with Pooley in his remark that we should not try to remove a foreign body that is embedded in the choroid. He would certainly remove foreign bodies embedded in the choroid and in the retina, or in the sclera itself, provided they can be broken loose by magnetic power. All foreign bodies in the interior of the eye—wherever they may be—should be removed if possible. Unfortunately, some foreign bodies become so deeply embedded in the sclera that we cannot swing them loose. Of course, in this event, we have to leave them, but under all other conditions, they should certainly be removed if possible, wherever located.

Pooley's rules concerning the removal of foreign bodies are worth considering. They are as follows:

First: If the lens is badly wounded, so that it must become opaque, and the foreign body is situated immediately behind it, he removes the lens and then the foreign body, through the cornea. It is to be assumed that he uses the original wound as the avenue of withdrawal.

Second: This rule indicates that if the lens is not wounded, or only slightly wounded, or for other reason it is not desirable to remove the lens, and the foreign body is situated behind the lens, he removes the foreign body by means of an opening thru the conjunctiva and sclera.

The writer is perfectly sure that this

method of dealing with vitreous chamber steel particles is much safer than the one still advocated by Haab of practically removing all foreign bodies through the cornea. Haab's method of coaxing such particles forward, by means of the giant magnet, sounds nice, and of course, it can be done, but I do not believe it is often done in this very pleasant fashion. Most of these foreign bodies are drawn forward by main force, thru and over the ciliary processes, iris, etc., and out thru the cornea, leaving a trail of damages back of them, that are most jeopardizing to the safety and well being of the eye. It is almost inconceivable how this method can be considered safer than it is to open the sclera, the choroid and retina, and bring the foreign body out thru this route.

Of course, there is some danger of detachment of the retina and of involvement of the retina and choroid in the scleral wound, and in some loss of vitreous, infection, etc. These dangers must be admitted, but they seem quite trivial, as compared to the dangers involved in the other method of extraction.

Before making the scleral opening, the foreign body should have been localized—either by X-ray pictures, a localizer, or both. The conjunctiva is then picked up with a pair of forceps and a large triangular flap is made in the conjunctiva, with the apex pointing anteriorly. The opening in the sclera is then made with a Graefe knife. This is made in the direction of the course of the muscles, between the muscles and as near to the location of the foreign body as possible. The scleral opening is made as far back as possible, in order to avoid the delicate structures in the anterior portion of the globe. The writer does not make a transverse section, as recommended in some cases by Pooley, as such sections encourage the evacuation of vitreous humor and the wounds do not heal as well after the operation. The opening is made as long as seems indicated, as estimated by the size of the foreign body, as seen in the X-ray pictures. A good sized opening is best because it is much bet

ter for the foreign body to be extracted easily. The writer has devised two nonmagnetic hooks, very small in size, that an assistant hooks into each side of the scleral wound. By means of these hooks the wound can be gently retracted, or opened, which takes the place of the transverse incision, as recommended by Pooley. The assistant holds the lips of the incision apart with these hooks, while the surgeon manipulates the magnet. The writer has used this method for years and is quite satisfied with it.

An effort should be made to aim the point of the magnet in such a way that it is as nearly as possible on a line with the long axis of the foreign body. A foreign body can be much more easily removed in this way. If a foreign body, for instance, is long, and the magnet catches it in the middle, it might take an enormous opening to re-

move it, whereas, if we can only attract the foreign body in the direction of its long axis, it will easily come out thru a much smaller opening. This is a most important point in the removal of steel particles, and the writer has seen it demonstrated many times. Pooley recommends retroocular injection of the anesthetic. This is not necessary. A holocain, cocain and adrenalin mixture should be dropped on the eye until anesthesia occurs, and then the conjunctival flap should be made. Cocain should also be dropped on the other eye as it enables the patient to keep both eyes quiet. Then cocaineize the sclera before making the incision. Patients never complain of the pain of the incision. They only complain of the pain induced by the attraction of the foreign body for the magnet. The writer never sutures the sclera. He merely sutures the conjunctiva.

## TUMORS OF THE EYEBALL AND STRUCTURES ACCESSORY THERETO.

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A review of recent literature with illustrative cases from the author's personal experience. Read before the Los Angeles Ophthalmic Society, February 19, 1918.

The purpose of this communication is to call attention to the more frequently encountered tumors of the eye. It, perchance, will refresh your minds as to the need, in certain instances, of greater urgency to make an early diagnosis, and to either eliminate the mass or remove the organ.

All parts of the eye and its appendages may be subject to invasion by new growths, varying widely in type and location. Snell reported<sup>1</sup> in 1916 a case of unusual interest, in that the growth was a large epibulbar melanosarcoma occupying two-thirds of the nasal limbus, and overlying a good portion of the cornea. The mass had eight distinct lobes each supplied by a separate blood vessel.

In general, we arbitrarily refer to growths involving the appendages and

external parts, and to those of the intraocular structures. In instances, particularly neglected cases, all parts may eventually become more or less involved. Much the greater proportion of growths encountered are malignant, some more highly than others. Many of those which may be classed as non-malignant, if not treated, cause widespread destruction, largely by mechanical means. Of the external growths, a good portion are nonmalignant, or only mildly malignant, yet all should be removed as there are no means of determining just how soon they may take on a malignant character. Of the intraocular types, by far the greatest percentage are malignant, which of course demand immediate removal of the organ.

During the past three years, there



have been about ninety-three papers or reports of tumor cases in current ophthalmic literature. Fully two-thirds of all reported cases were malignant, about one-half were intraocular. One-third were represented by the various types of sarcoma, which was followed next in frequency by neuro-epithelioma. Eleven of these papers come to us from Japan. Komoto,<sup>2</sup> in the *Nippon Gankwa Zasshi*, contributes to our knowledge of primary uveal tract sarcoma with notes concerning one hundred cases.

#### TUMORS EXTERNAL TO EYEBALL.

Regarding tumors affecting the external parts, both malignant and benign growths of the lids, caruncle, conjunctiva, cornea, sclera and orbit have been observed. Papillomas of the lids are of comparatively frequent occurrence. Freytag<sup>3</sup> observed it in a child aged four years, and it relapsed several times after excision. Angioma, lymphoma, moles, epithelioma and sarcoma are occasionally encountered. The last named tumor, according to the number of reported cases, indicates the condition as uncommon. About eighty to eighty-five cases have been collected by Wilmer,<sup>4</sup> Veasey,<sup>5</sup> Alling<sup>6</sup> and de Schweinitz.<sup>7</sup>

According to Birch-Hirschfeld<sup>8</sup> most of the growths of the *lacrimal gland* are mixed tumors. He reports removing one successfully in a man aged 57 years. Some years ago, at my clinic at the Chester Hospital, I observed symmetric lymphomata of the lacrimal glands (Mikulicz's disease) in a colored girl aged 17 years. Many of the glands of the body were palpable including the parotids. At the site of the lacrimal glands were large masses giving the peculiar drooping of the angles of the lids resembling the eyes of a bloodhound. This was the second case I had observed, the first being one which Dr. Posey showed several years ago at the Wills Hospital. No cases were reported during 1917, but the year previous, Dr. Posey<sup>9</sup> reported one, in a colored girl, in which positive tubercular and syphilitic reactions were obtained. However, Posey agrees with those observers who believe that in

view of the fact that no specific bacteria have been discovered, the condition is probably chemotactic.

Valli<sup>10</sup> observed large papillomata of the limbus with invasion of the cornea, in three patients, aged 67 years, 56 years, and 54 years. The masses had been present 10 years, 6 years, and 3 years respectively. They were 10 x 12 mm. in extent. Excision and galvanocautery were used. The papillary character of the tumors was well marked, microscopically. Marchi<sup>11</sup> described two interesting cases of small tumor developing on the pannus, in eyes affected with trachoma. The masses were composed of plasma cells with an abundance of new formed blood vessels.

Epibulbar sarcoma, epithelioma, lymphoma, fibroma and *dermoid cyst* are at times observed. The last named growth afforded me an interesting experience upon one occasion. The patient, an Italian, was seen at my clinic at the Chester Hospital. He complained of a small swelling under the upper lid of the left eye. A tentative diagnosis of cyst, possibly dermoid, was made and yet, owing to the unusual location, just to the nasal side of the median line, the question of an encephalocele was considered. The mass was comparatively small and easily compressible against the eyeball. The small finger was unable to detect any opening in the bony orbital wall in the frontal nasal region. Believing I was dealing with a small superficial cyst, after a few instillations of cocain, I proceeded to remove the same. In a very short time I discovered how completely I had miscalculated the extent of the mass. It was necessary to greatly enlarge the field of operation forcibly rotating the eye outward and downward, and carrying my dissection well in toward the apex of the orbit. Microscopic examination showed a dermoid cyst.

Growths involving the external part have been treated in a variety of ways. Some by excision, others, as in the cases of epibulbar epithelioma reported by Collins<sup>12</sup> and also by Heckel,<sup>13</sup> by the use of radium bromid. Massey<sup>1</sup>

recommends zinc ionization. The galvanocautery has been used. Several of my cases have been treated very successfully according to Clark's<sup>15</sup> method of desiccation. It seems to me a most efficient and desirable form of treatment. The advantages being, better cosmetic effect, no hemorrhage, it can be repeated, and a large or small area can be attacked without the danger of a contracted cicatrix. Most growths can be removed without an anesthetic, but if desirable, a local anesthetic can be used.

Abscesses, tubercular tumors, angioma, osteoma and intradural tumors (cystic, fibrous, or glia tissue) of the orbit, all produce displacement of the eyeball, not only forward but in most cases deviation from the primary position depending upon the location of the growth. Of the osteomata, the majority are attached at points around the orbital margin. In Blanco's one case<sup>16</sup> and Cirincione's series of three cases<sup>17</sup> the growths were removed with comparative ease, and with little disturbance except in one case of the latter's. In this case the bony mass practically filled the orbit. The operation consisted in excavating a new orbital cavity.

At the solicitation of Dr. Bakes, of Phoenix, I was asked in consultation to examine a baby girl aged nine months. The parents stated that when the baby was aged two months, they noticed the left eye rather prominent. This gradually increased until it had assumed a position of great prominence. The lids did not close the fissure by several millimeters. Not any of the superficial vessels were engorged. The globe was directed forward, did not deviate and was not compressible. It moved in harmony with its fellow. The iris responded actively to light. The baby would direct the eye toward any bright object. The fundus appeared normal except, perhaps, moderately full veins. The radiograph was defective and gave no information. Owing to the absence of inflammatory signs, the moderately slow growth, and position of the eye, directly forward, a diagnosis of intradural growth, or at

least a mass in the muscle cone was made. The character of the mass, possibly being cystic, fibrous or composed of glia tissue. An opportunity to confirm the diagnosis was not obtained as the parents refused operative interference.

#### INTRAOCULAR TUMORS.

The comparative infrequency of *intraocular growths* in the routine experience of the oculist, compels one to turn to literature for much of his information. In considering the subject of intraocular growths, particularly those of a malignant type, it is well for us to bear in mind the fact that they are of more than local importance, as they frequently establish a clew to obscure pathology in other parts of the body. The metastasis frequently observed in sarcoma and neuroepithelioma are good illustrations. Early diagnosis, followed by immediate operative interference, has given to the ophthalmic surgeon a greater percentage of recoveries and freedom from transference to other parts of the body, than has been attained in general surgery. The reason for this is the fact, that early, the tumor is confined within a tough fibrous capsule; the sclera.

It is the part of wisdom to remember that an adult's eye with a history of being blind, suddenly becoming inflamed, hard and painful, is an object of serious suspicion, for frequently the smallest tumor can excite a glaucomatous attack. McGuire's first case of his series, published the past year,<sup>18</sup> demonstrates the importance of this observation. His patient suffered a severe glaucomatous attack but, owing to the very hazy cornea, he was unable to examine the fundus. The fellow eye showed a large, deep suspicious cupping of the optic nerve, but no inflammatory symptoms. The field was good. Iridectomy was performed upon the inflamed eye without beneficial results. Enucleation revealed a sarcoma. With the exception of tubercle and gummatous growths, primary tumors of the iris and ciliary body are rare.

During the past year four reports of *sarcoma of the iris* appeared in current literature. Bell<sup>19</sup> observed a primary

melanosarcoma of the iris, the eye was in the inflammatory or second stage. The diagnosis was confirmed microscopically, following enucleation. The condition is unusual. Fuchs<sup>20</sup> found primary sarcoma once in sixteen cases of uveal tract sarcoma. Moorfields Hospital Reports<sup>21</sup> showed one in one hundred and three cases. Fuchs suggests that if the growth is small it may be removed by iridectomy. This measure seems to me to be a dangerous procedure, in that, owing to the opening of the blood stream tumor cells might invade the ciliary region. As a diagnostic aid it is permissible, but the

per<sup>23</sup> could find no primary focus in his reported case of carcinoma of the ciliary body. This is a most unusual observation, for authorities are agreed that the condition is always metastatic. It is an interesting observation in view of the frequency with which cancer is encountered in other parts of the body, that even metastatic cases are rare. One theory in explanation of this is the complicated manner in which the blood stream enters the eye.

#### SYPHILITIC TUMOR OF IRIS.

Regarding the more frequently observed condition affecting the iris,

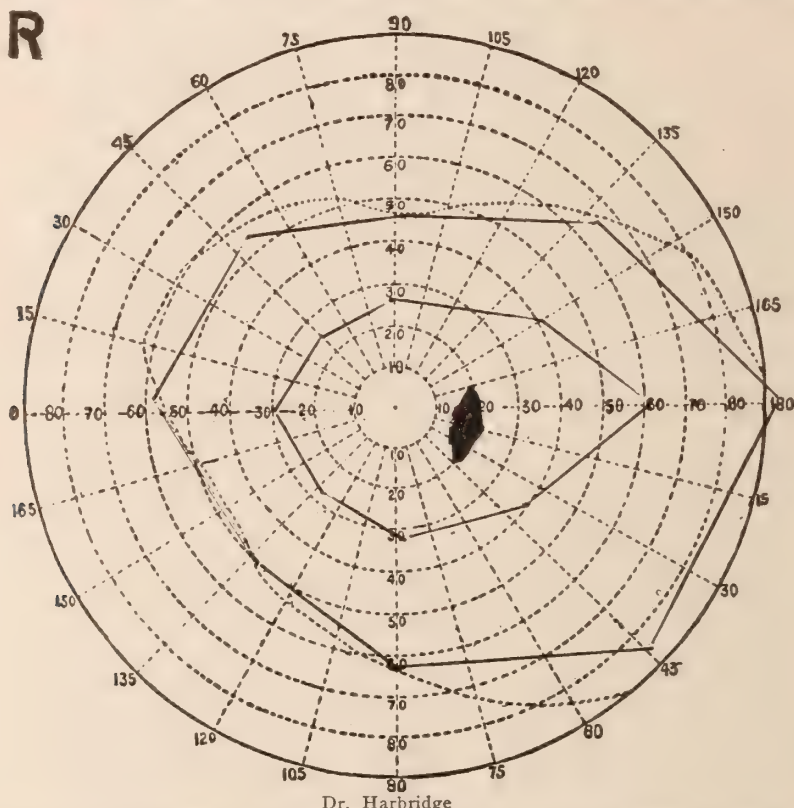


Fig. 1 Field of vision, right eye, showing enlarged blind spot in case of gumma. (Harbridge).

only safe thing to do is to sacrifice the eye.

Brown's case<sup>22</sup> reported in 1916, which was diagnosed as glioma, proved upon enucleation, to be a bony tumor springing from the ciliary body. It was observed in a girl aged 18 years and was probably fetal in origin. Nee-

namely, gumma or papule, the following case history is of interest in certain details. D. A., aged 32, M. S., first observed December 26, 1917. Initial lesion early in June, 1917. In October he had an attack of iritis, first in one eye then in its fellow. Subsequent to this inflammation the eyes appar-



ently became quiet and remained so, until December 20th, at which time the left became painful.

Examination showed right pupil dilated, kidney shape, synechiae and several pigment spots on the anterior capsule. Left pupil under atropin dilated poorly. To the temporal side there was a broad bandlike attachment between the iris and the anterior capsule, the pigment border of the iris being free. Overlying this and placed rather

severe temple pain. I do not remember ever having seen a patient suffer so acutely as he did for the next three days. The entire temple region was suffused with blood, the superficial vessels standing out prominently. With the artificial leech 2 to 2½ ounces of blood were withdrawn, ¼ gr. doses of morphin were administered hypodermically 5 or 6 times the first 12 hours. Subsequent to this attack the mass began to lessen in size, and at the end of

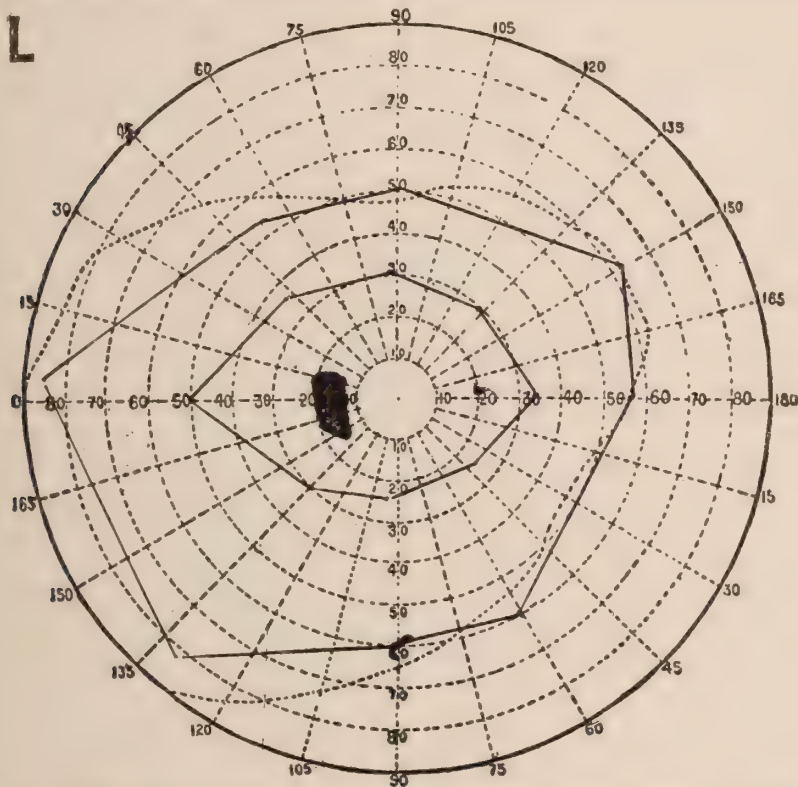


Fig. 2. Field of vision, left eye, showing enlarged blind spot in case of gumma (Harbridge).

more on the ciliary zone side of the lesser circle, was a yellowish brown mass, apparently pushing up from the crypts in the stroma of the iris. Deposits in Descemet's membrane were discrete, disc shape areas, larger, denser and not so numerous as in the usual type. The mass, about 3x4 mm. in extent, apparently sprang from near the center of the iris. It was single.

Two weeks after having been first observed, the mass being perhaps a trifle larger, the patient developed a

a month, practically disappeared, leaving a small area in which the pigment of the iris was absorbed and scarred. Two doses of salvarsan, K. I., mercurial ointment, and atropia were the remedies used.

I am inclined to believe this tumor mass partook more of the nature of true gumma rather than a late papule. There are features in favor of either view. It is quite common to refer to any elevation in the iris in syphilitic cases as a gumma, but it seems to me

the term should be reserved for the later and papule for the early stages. Papules usually occur early; Santos Fernandez<sup>24</sup> observed it as early as one month and as late as 4 years after the initial lesion. It is, as a rule, multiple, most frequently occupying the pupillary border, occasionally the periphery and much less frequently the lesser circle region. True gumma, which is far less common, is in many instances a much more serious matter. It occurs as one large mass, usually at the temporal side, at the periphery of the iris; but has been observed in the lesser circle region. It leaves a minute scar and pigment absorption which remains. The adhesion to the anterior capsule is a broad bandlike rather than a pigment spotlike attachment. It is an indication of a more virulent type of infection and foreshadows later certain nervous disturbances. The greatly enlarged blind spot in the visual fields of this patient may be a forerunner of a confirmation of this opinion.

#### SARCOMA OF CHOROID.

Doubtless a diagnosis of *intraocular tumor* of the deeper structures, in many cases, is never made, or at least only accidentally, as in Ramsay's third case,<sup>25</sup> following an injury. The eye was removed, believing there was present a detached retina. Examination showed a spindle-celled sarcoma. The order of frequency of occurrence of tumors of the choroid and retina is sarcoma, neuroepithelioma, and cancer, the latter being quite rare, and, as we stated, always metastatic. The two former are usually primary and very prone to metastasize to other parts of the body.

The four stages of these growths are, invasion and detachment of the retina, inflammation and increased tension, rupture of the globe and the stage of metastasis. Regarding the increased tension, some authors make the statement that it is purely mechanical, owing to the increase in size of the mass. This hardly accounts for all glaucomatous attacks, for many cases are on record in which the growth was very small. A much more tenable explana-

tion seems to me to be the theory of increased serous outpouring and the blocking of proper drainage, together with the location of the mass.

The striking feature in Jackson's recently reported case<sup>26</sup> of sarcoma of the choroid was its duration—over fourteen years from the time sight was noticeably impaired and two and a half after glaucomatous symptoms had arisen, until the eye was enucleated. Nettleship<sup>27</sup> reported a case of twenty-four years' duration. In Kipps' cases<sup>28</sup> the eye was enucleated twenty-two years after it was first advised.

This is in striking contrast with a case which I recently observed, but did not treat. In view of the above reports, I have wondered what influence, if any, the treatment had. The parents of a girl aged 10 years stated that they had observed that the iris to the nasal side seemed pushed forward during the previous few weeks. Examination. Vision 6/6 T. N., perforating vessels slightly engorged. The iris to the nasal side was bowed forward. By oblique illumination, well under cover of the iris, was a small mass, giving a greenish reflex. Despite a negative Wassermann, three or four doses of salvarsan were administered, upon the advice of the family physician who had treated the father for syphilis 12 years before. Tuberculin was administered for diagnostic purposes. Under the belief that both a general and local reaction was obtained, repeated doses of a considerable amount of O. T. were administered every three or four days for possibly three weeks. Within six weeks the mass had grown to very great size, pushing well over to the median line of the eye. Early glaucomatous symptoms developing, the eye was enucleated. Microscopic examination showed sarcoma.

In view of Jackson's paper intimating the long duration of sarcoma, I have wondered what influence, if any, the administration of tuberculin may have had in the matter of stimulating the growth to greater activity. In this connection it is interesting to note Hiram Woods' recently published experience with tuberculin<sup>29</sup> in the treatment

of choroiditis, in which the condition was greatly aggravated.

#### GLIOMA OF RETINA.

*Neuroepithelioma*, or *glioma*, is not without interest. During the past year six contributions to literature have been made. In Ring's reported case<sup>30</sup> interest centers in the fact of the great size, 20 inches in circumference, of the recurrent mass. The mass was removed by the bipolar d'Arsonval current using a chain snare. The operation was done in two stages, followed by Roentgen rays. The child lived five months. Metastases occurred in the region of the 8th and 9th vertebrae.

Taylor and Fleming's case<sup>31</sup> is of interest, not only owing to its being bilateral, but because of the metastatic findings in the brain and meninges, vertebrae, mesenteric glands and ovaries. Berrisford<sup>32</sup> in 1916 in his statistical report of the Royal London Ophthalmic Hospital, found that bilateral neuroepithelioma occurred in 14.6% of cases. Wintersteiner's observations<sup>33</sup> were that about 25% occurred. Griffith<sup>34</sup> found upon examining literature, a record of eight histories of transmitted neuroepithelioma. His own observation is of two families in which the tumor was transmitted by the mother. In the first family the mother lost one eye, and out of six living children, four had bilateral growths, while one lost one eye and one escaped. In the second family, the mother lost one eye, and of three living children, in one the growth was bilateral, and in two unilateral.

Bilateral neuroepithelioma is primary in each eye and is not transmitted from one organ to the other. The growth starts from the two granular layers of the retina. The exophytum usually begins as minute nodes spreading along the subretinal space forming a mound like deposit. The endophytum shows protrusion of the whole mass with a rather irregular surface toward the vitreous. Neuroepithelioma has been observed shortly after birth and as late as the third year. Two-thirds of the cases occur before the

third year. It is interesting to note that statistical reports from Moorfields during five years showed that seven out of twenty-four eyes enucleated proved to be pseudogrowths. In true tumor cases, the tension is plus, in pseudogrowths it is minus; yet in Sidney Stephenson's case,<sup>35</sup> which proved a pseudotumor, the tension was plus one.

The specimen presented is that of neuroepithelioma. The eye was removed by Dr. Brownfield, of Phoenix, from a little girl, aged two years. The parents stated that they had not noticed anything particularly wrong with the eye, and yet it did not seem to have the same appearance as its fellow. When Dr. Brownfield explained the nature of the disturbance and the necessity of immediate removal of the eye, the parents were very much shocked. They consulted several oculists in Phoenix and two or three in Los Angeles. These consultations were all confirmatory. Dr. Watkins, of Phoenix, also confirmed the diagnosis microscopically. A piece of the optic nerve was examined and showed no pathologic changes. Time, of course, is the only thing that will determine how successful the operation will prove in preventing recurrence and preserving life.

Thirteen percent of cases survive. Regarding this matter, observations differ widely. Adams' published report<sup>36</sup> in 1916 showed 54% well after three years, while Wintersteiner found only 16%. If a patient lives for over three years after the operation, it is considered safe. Yet recurrences have been noted as remote as five and a half years, and as early as one month after enucleation. Retrogression of the growth was observed by Meller<sup>37</sup> and also Purtscher.<sup>38</sup> A point of great importance, however, is to remove as long a piece of the nerve as possible, and have it examined microscopically. If any evidence of changes are present a complete exenteration is indicated. The case is more favorable if the growth has not passed beyond the lamina cribrosa.



## BIBLIOGRAPHY.

1. Snell. Transactions American Ophthalmological Society, v. 14, p. 556.
2. Komoto. Nippon Gank. Zasshi, Jan., March, May, Sept., Nov., 1916.
3. Freytag. Graefe's Arch. f. Ophth., v. 90, p. 367.
4. Wilmer. Transactions American Ophthalmological Society, v. 7, p. 91.
5. Veasey. Transactions American Ophthalmological Society, v. 8, p. 519.
6. Alling. Transactions American Ophthalmological Society, v. 10, p. 265.
7. de Schweinitz. Transactions American Ophthalmological Society, v. 14, p. 341.
8. Birch-Hirschfeld. Graefe's Arch. f. Ophth., v. 90, p. 110.
9. Posey. Ophthalmic Record, v. 25, p. 286.
10. Valli. Annali di Ottalmologia, v. 44, p. 755.
11. Marchi. Archivio di Ottalmologia, v. 23, p. 611.
12. Collins. Transactions Ophthalmological Society United Kingdom, v. 35, p. 215.
13. Heckel. Transactions American Ophthalmological Society, v. 14, p. 560.
14. Massey. New York Medical Journal, v. 105, p. 751.
15. Clark. Annals of Ophthalmology, v. 24, p. 439.
16. Blanco. Archivos de Oftalmologia, Hispano-Americanos, v. 17, p. 181.
17. Cirincione. Annali di Ottal. e Clinica Oculistica, v. 1, p. 81.
18. McGuire. Ophthalmology, v. 13, p. 454.
19. Bell. Transactions American Ophthalmological Society, v. 15, p. 141.
20. Fuchs. Graefe's Arch. f. Ophth., v. 86, p. 155.
21. Royal London Ophth. Hospital Reports, v. 20, p. 296.
22. Brown. Ophthalmology, v. 13, p. 53.
23. Neep. Annals of Ophthalmology, v. 25, p. 611.
24. Santos Fernandez. Boletin de la Sociedad de Oftalmologia, Buenos Aires, v. 2, p. 24.
25. Ramsay. Ophthalmoscope, v. 12, p. 339.
26. Jackson and Finnoff. Transactions American Ophthalmological Society, v. 15, p. 194.
27. Nettleship. Royal Society of Medicine, Section on Ophthalmology, v. 6, p. 1.
28. Kipp. Transactions American Ophthalmological Society, v. 9, p. 352.
29. Woods. Transactions American Ophthalmological Society, v. 14, p. 189.
30. Ring. Transactions American Ophthalmological Society, v. 15, p. 217.
31. Taylor and Fleming. Royal Society of Medicine, Section on Ophthalmology, Nov., 1916.
32. Berrisford. Royal London Ophth. Hospital Reports, v. 20, p. 296.
33. Wintersteiner. Das Neuroepithelioma Retinae, Leipsic and Vienna, 1897.
34. Griffith. Ophthalmological Society United Kingdom, v. 31, p. 132.
35. Stephenson. Ophthalmoscope, v. 14, p. 518.
36. Adams. Boston Medical and Surgical Journal, v. 176, p. 768.
37. Meller. Centralblatt f. p. Augenheilkunde, v. 40, p. 108.
38. Purtscher. Centralblatt f. p. Augenheilkunde, v. 39, p. 193.

## NOTES, CASES AND INSTRUMENTS

In this department will be published brief reports of cases, descriptions of new instruments, and notes or suggestions of interest to workers on ophthalmology.

### CYSTIC BRAIN TUMOR WITH PAPILLEDEMA. AUTOPSY FINDINGS.

GEORGE F. LIBBY, M. D., D. OPH.

DENVER, COLORADO.

A youth in his eighteenth year was referred to me by Dr. M. Kleiner, for ophthalmic examination, October 16, 1917. The patient complained of daily headache, extending from the eyes to the occiput, associated with some nausea and occasional vomiting. There was a history of prolonged treatment,

with large doses of the bromides, for Grand Mal. Dr. Kleiner's diagnosis was Petit Mal. The patient was well nourished but defective mentally. He had been able to acquire a fair education, was of gentle disposition, but his mental action and speech were slow and hesitating. Correction of hyperopic astigmatism of moderate degree gave normal vision in the right eye, and about 5/8 in the left.

The ophthalmoscope showed clear media, normal retina, and the following appearance of the optic nerve heads:—disks irregular in shape, margins ob-

scure, glistening white deposits which obscured the physiologic cups as well as the lamina cribrosa, and opaque nerve fibres extending outward slightly from the borders of the discs. These nerve changes impressed the examiner as being congenital. The pupil reflexes were normal. On account of the patient's defective mentality the fields for form and color were not taken.

About November 15th the patient kept his bed, being markedly somnolent and lethargic, but recognizing friends on being aroused. There was slight vomiting. The pupil of the right eye suddenly dilated and the vision of this eye was found greatly reduced. The cutaneous and cremasteric reflexes and Kernig's and Babinski's signs were always present, the patellar reflex absent at times. There was also rigidity of the cervical muscles. But there was no delirium, fever (temperature constantly subnormal), headache or muscular paralyses. Thus, many signs of meningitis were present, and others absent. On the other hand, while a beginning optic neuritis suggested both meningitis and brain tumor, yet there were no localizing signs of cerebral pressure. Past and present tuberculosis, syphilis, and nephritis were excluded.

On November 19th an examination at Mercy Hospital showed widely dilated pupils with feeble reaction to light or convergence. Distinct optic neuritis had developed, the papilla being edematous and hyperemic, the disc outlines being lost in edema of the adjoining retina at some points (especially the upper temporal quadrants), with moderate swelling of the nerve head. No further retinal edema or hemorrhages were observed. The vision was reduced to barely recognizing faces.

Re-examination on November 23rd presented pupils dilated ad maximum, an immobile iris, and vision of counting fingers only. The nerve head was grayish white and slightly more swollen. The retina showed no involvement except in the immediate vicinity

of the disc. Its veins were somewhat dilated but not especially tortuous, the arteries were of normal caliber or slightly contracted.

Soon after talking with his parents, on November 25th, the patient's respiration apparently ceased, and could not be restored; although the heart continued to beat for  $2\frac{1}{2}$  hours, when death occurred.

The reports of the examination of the spinal fluid, on November 14th, and of the autopsy on November 26th, 1917, by Dr. Philip Hillkowitz, are as follows: (1) Cell count, 7. Globulin, faint opalescence. Wassermann reaction, negative.

(2) *Autopsy limited to the head.* On the median side of the inferior horn of the lateral ventricle on the right hemisphere is found an area of softening about 5 cm. in diameter and one cm. in thickness, of a gelatinous consistency. Parts of the wall are yellow in color and other parts streaked with blood.

The softened area from the wall of the cyst is about the size of a hen's egg, apparently connecting with the ventricle, the floor of which is situated in the lower temporal lobe about 1 cm. from the surface.

Contents of the cyst: a straw-colored fluid. The rest of the brain shows no deviation from the normal. The cyst seems to have been, partly at least, a result of the softening.

Parsons says: "The chief cause of papilledema is the presence within the cranium of some adventitious material, which may be solid or fluid. \* \* \* Clinically the form of adventitious deposit which most frequently gives rise to choked disc, is tumor of the brain." Gowers and many other authorities agree with this; but an observer as careful and experienced as R. Greeff is inclined to give precedence to the various forms of meningitis. It has been shown that youth is much more liable to develop choked discs than age. H. L. Singer found 28 years to be the average in 51 cases of marked choked disc, out of 88 cases of brain tumor.

## REPORT OF TWO CASES.

HOWARD F. HANSELL, M. D.

PHILADELPHIA, PA.

Read before the Section on Ophthalmology, College of Physicians, Philadelphia, February 29th, 1918.

## CONCUSSION OF EYE AND REMOVAL OF TWO BULLETS FROM ORBIT.

M. G., aged 34, while explaining the inner workings of an air rifle presented by him to his little son on Christmas, 1917, accidentally pulled the trigger while the business end of the barrel was pointed toward his right eye. Two bullets, one round, the other ragged and of smaller size, struck the eye on its nasal side and entered the orbit. Vision = 6/20. The conjunctiva was torn and discolored but in the eyeball itself there was no hemorrhage, exudation or other change, except that the pupil was slightly dilated, reacted slowly and was not quite circular. Tension normal. Rotation inward restricted. No limitation of field. Objects were indistinct and seemed to be unsteady.

The presence of two foreign bodies was distinctly shown on the X-ray plate made by Dr. Manges. In his efforts to locate their proximity to the ball and to know whether either one was imbedded in the sclera, Dr. Manges made a second plate. The shadows on this plate he was unable to interpret. In addition to the two distinct shadows, five or six more, less marked, but similar in outline, were discovered scattered through the orbit. The preservation of intraocular normal tension and the absence of ophthalmoscopic changes confirmed the opinion that the bullets were outside of the ball.

By careful and tedious dissection the two bullets, so well shown in the first plate, were removed. The internal rectus was not divided or detached. The immediate result of the operation was to still further limit the internal rotation of the eye. The contraction of the internal rectus was hindered by exudation and blood. Two weeks later report from the patient by letter was that the eye was well and its usefulness restored.

There are, I believe, two kinds of air rifles on the market, one that fires a single bullet, the other several bullets, six or more. The patient stated that his was the first kind but he could not explain the presence of the two foreign bodies—one complete and round with the exception of a facet, and the other, half the size, irregular in shape with sharp and ragged edges. I ascribed the lowered vision to concussion of the eyeball.

## PERFORATION OF CORNEA PERSISTING EIGHT MONTHS.

Case 2.—Miss M., a nurse in a hospital in a Southern city, contracted gonorrheal ophthalmia in the right eye, in January, 1917, while caring for a patient. The infection was severe. Notwithstanding great skill and care the cornea became the seat of a perforating ulcer. The infection was confined to the right eye. By May, four months later, all signs of inflammation had subsided and the conjunctiva had regained its normal thickness and appearance, but the perforation of the cornea had not healed. She resumed nursing and her ordinary pursuits. In January, 1918, she came to Philadelphia bringing a letter from her oculist stating that the perforation had persisted through all the months and no treatment had availed to restore the continuity of the cornea.

At this time vision R. (the affected eye) equalled 6/30; L. equalled 6/6. Tension of R. — 3. In the center of a circular gray opacity in the lower section of the cornea a minute dark point could be seen by close inspection. The iris was adherent to the scar and in contact with the remainder of the cornea. The aqueous humor escaped as soon as formed through the perforation.

A flap of conjunctiva was detached and sutured into such a position that the lower three-fourths of the cornea was covered by it. The anterior chamber was restored in twenty-four hours or sooner. The stitches were removed on the third day when the flap had gone back into its normal position. V. = 6/12, improved by a + 1 cyl. ax. 90°



The unusual, interesting and, in my experience, unique feature in this case is the long continued—eight months—annihilation of the anterior chamber without infection or injury of any kind to the tissues posterior to the cornea.

## WHY ARE THE LENS AND IRIS PUSHED FORWARD IN GLAUCOMA?

BY OTTO WIPPER, M. D.  
CHICAGO.

In the theories of glaucoma little is said with reference to this symptom.

are some objections to that theory.

The most plausible theory as to the cause of the plus tension seems to me the increase of fibrous tissue and the shrinkage of tissues in general occurring with advancing age, also affecting the evacuating lymph passages, thus restricting the outflow of lymph. There must also be a restricted inflow as long as no inflammation exists. Within the aqueous chamber the inflow is lessened by the contraction of the iris, and the inflow into the vitreous must be below normal, due to the pressure upon the secreting structures. But the restric-

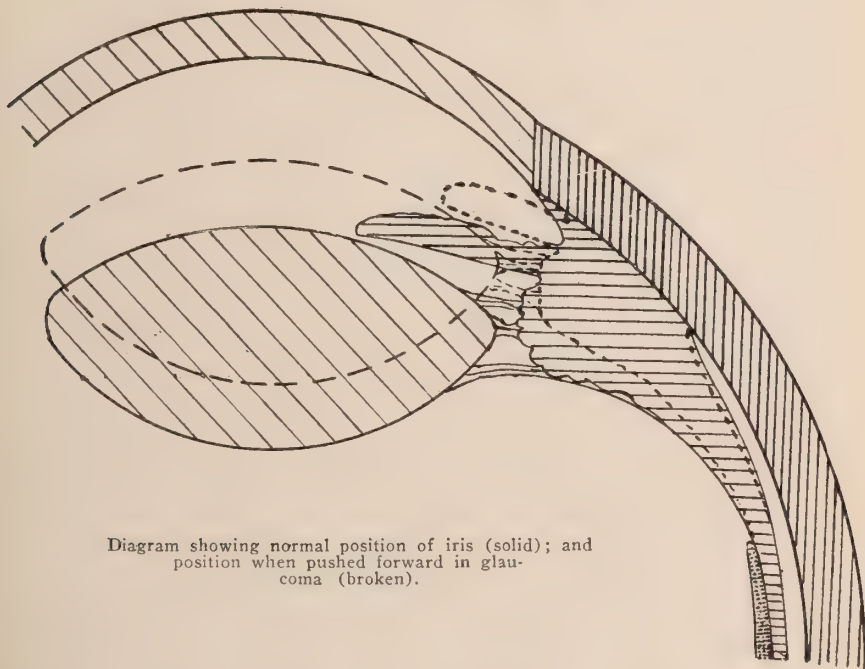


Diagram showing normal position of iris (solid); and position when pushed forward in glaucoma (broken).

According to Priestley Smith, the increase in tension begins in the vitreous chamber owing to the enlarged lens coming in contact with the ciliary processes, thus preventing the lymph from passing into the aqueous chamber. The partition formed by the lens, suspensory ligament and ciliary body, is displaced forward, equalizing the hydrostatic pressure of the two chambers, I simply mention this because an explanation is given for the pushing forward of the partition; otherwise there

tion of the inflow is less than the restriction of the outflow; hence the increased tension.

The ciliary body and iris are practically surrounded by three definite lymph spaces, except the area, where the pectinate or cribriform ligament is firmly attached to the sclera. These three lymph spaces are the aqueous and the vitreous chambers and the anterior portion of the suprachoroidal space, the latter extending about 4 mm. anterior to the ora serrata, where the attach-

ment of the pectinate ligament begins posteriorly.

The hydrostatic pressure within the three spaces being equal, any compression of the iris and the ciliary body must be mainly in the direction toward that portion which is not in contact with the lymph spaces. This portion, the attachment of the pectinate ligament, is quite anterior and broad, measuring about 4 mm. from the limbus to the suprachoroidal space.

While the anterior attachment of the ciliary body is broad and firm, the posterior is quite narrow and flexible where the structure blends loosely into the choroid. The lamina fusca within the suprachoroidal space is also a very loose tissue, and easily detached.

Having the anatomic picture in mind, considering that the delicate structures of the iris and ciliary body are almost entirely surrounded by lymph spaces, and considering the difference between the anterior and posterior attachments, one can readily see how the lens and iris are pushed or drawn forward.

In cases in which this displacement does not occur we probably have an obliteration of the anterior portion of the suprachoroidal space, and a more solid attachment of the orbicularis ciliaris to the sclera.

## MUSCULAR ADVANCEMENT FOR STRABISMUS.

BY DR. FRANCISCO M. FERNANDEZ.

HAVANA, CUBA.

The surgical treatment of strabismus has been the subject of so many different procedures that since the time of Dieffenbach one may count by the hundreds the innovations claimed and the appliances created. In spite of that, we have still humor to try any new procedures that are recommended and on that account have tried for the past two years the method recommended by Reese which consists in the resection of a part of the tendon, with very extensive freeing of the *aileron*s ligaments and leaving undisturbed the original insertion of the tendon in the

sclera. Reese uses three sutures, one central, with number 3 silk, and two lateral ones, and he has devised a new strabismus forceps or clamp that is really useful in the minute details of the operation. The method of tendon shortening by excision of a central part of the same originated with Noyes in 1874, and although some modifications to the original procedure have been from time to time published, we believe that the most advantageous is the one described by Reese, although perhaps its chief indication lies in cases of comitant strabismus, and not in cases of paralytic squint or in heterophoria that need surgical treatment.

Our reason for that statement is that the extensive incursions made by Reese in the lateral invaginations of the muscle might in cases not due to comitant squint tend to increase the existing disturbances, while in those cases, due solely to a defect of the fusion faculty generally, the only thing to be remedied in cases of long standing and needing surgical correction is the deviation.

The operation described by Reese is, according to our understanding, a conservative one as it does not alter the relations of the original insertions to the sclera, but not so in the extensive incursions into the lateral invaginations, for even if there is the possibility of not doing a sufficient correction of the deviation with a conservative procedure, there is always the recourse to a new invention, while by the free dissections of Tenon's capsule, there is danger not only of disturbing the normal equilibrium of the eye, that in some small part may be due to those invaginations, but also in the cicatricial stage there might be the danger of retractions that may cause a torsion of the eyeball. Any of these sequels must be as distasteful to the patient as to the surgeon himself.

We do not pretend to criticise Reese's method of muscular advancement, for with some small limitations such as the extensive incursions into the fibrous bands that are in relation with the ocular muscles, we have followed it; and the results have been sat-

isfactory in eleven of the twelve cases in which we have used it. Eight of them have been reported recently to the Havana Academy of Sciences. The case in which we failed was subsequently corrected by the tenotomy of the opposite muscle.

Our purpose with this short and small report is to praise Reese's procedure and also to justify our fears of the dangers that too free division of the lateral invaginations may cause.

We believe also that by doing away with the piercing of some part of the scleral tissue as practiced in the majority of the cases, and this could be done by the shortening and suturing from one end of the tendon to the other, there are other dangers avoided. In the first place the danger of infection, which of necessity must be greater

when the sclera is wounded. Then the danger of reactions from the traumatisms. And in the last term, the most important of all, the danger of piercing the sclera through, an accident that may occur to the most learned.

## CONVERGENT STRABISMUS.

Age	Degree	Vision	Date of Op.	Good Result
35	15°	1/200	Apr. 1916	20 mo.
28	20°	.....	May 1916	19 mo.
19	12°	1/200	May 1916	5 mo.
22	25°	.....	July 1916	Oct. '16
25	35°	1/100	Aug. 1916	June '17.
18	40°	.....	Dec. 1916	Dec. '17
28	...	.....	Jan. 1917	Mar. '17
33	30°	.....	Feb. 1917	1 mo.
45	...	2/20	May 1917	2 mo.
16	20°	5/20	June 1917	Immediate
27	20°	.....	July 1917	Feb. '18

## DIVERGENT STRABISMUS.

Age	Degree	Vision	Date of Op.	Good Result
17	25°	.....	Oct. 1916	Relapse
		Tenotomy	May 1917	Jan. '18

## SOCIETY PROCEEDINGS

### NETHERLANDS OPHTHALMOLOGICAL SOCIETY.

UTRECHT, DECEMBER 10, 1916.

Translated from the Nederl. Tijdschr. v. Geneesk., by Dr. E. E. Blaauw.

#### Ethylhydrocuprein Amblyopia.

J. VAN DER HOEVE presented a patient with atrophic discs and sclerosis of the retinal vessels (thin blood column, thick walls and local ectasias of the vascular wall). On account of pneumonia the man had received during 4 days 4 grams of ethylhydrocuprein hydrochlorid in doses of 0.2 gms., 6 times in 24 hours with milk-diet. After 3 days disturbance of vision occurred, and after 4 days amaurosis. The condition improved during the next two months; but important changes remained. Vision was lessened to one-third. There was total loss of color perception, and great disturbance of the light sense. He needed 10 times more light than a control person. There was slight diminution of the adaptation, and peripheric limitation of the visual field.

Directly after the poisoning retinal edema with normal vessels was present. Two weeks later there was narrowing of the vessels in O. D. a few days later in O. S., while the edema receded or disappeared in the macular region and disappeared. Van der Hoeve supposes that the drug poisoned both the nervous elements and the vessels and thinks its use undesirable. From the reports it appears that the hydrochlorid is the preparation least desirable.

DISCUSSION.—Schoute had seen a case which recovered. A patient had received 18 capsules of optochin during a pneumonia in Germany, although he became stone-deaf on the third day. The deafness disappeared after 3 days, but shortly after he became stone-blind. He stopped the medicine, recovered from his pneumonia, and Schoute found a month later V. O. D. 6/10, V. O. S. 10/10. The pupils reacted normally; but there was well marked hemeralopia and concentric narrowing of both visual fields. Discs showed normal color, while the retinal arteries were much narrowed.



**Central Visual Acuity.**—Because the examination of the visual acuity is often considered equal with an examination for the minimum separabile, Roelofs had made the examination with a number of objects of different lengths and widths. The minimum separabile, the angle under which the smallest recognizable interspace between two objects is seen, is no constant quantity. It varied between 22 and 89 seconds with the objects used. It may be, however, that the observation width of the minimum separabile is still a constant quantity, although the interspace itself is not. If two squares, the diameters of which are equal to the interspace, are used, with the first observation of separation the entire length will appear to be three perception circles. The true length does not need to agree with this. If one takes a long row of such squares, one may suppose that at the first recognition of this square-line the diameters of the perception-circles concur with the diameter of squares or interspaces. The diameter of a perception-circle was found for an emmetropic eye, about 50 seconds. The smallest perception width is therefore equal to the diameter of a perception circle while using squares. It is however not necessary that the same should be the case for lines. It appeared, that the smallest perception width for the same eye was at the utmost 40 seconds when using lines. It is recommended to use for this examination a few parallel lines, which are as broad as the interspaces.

The defects of the optical system can partly explain why the minimum separabile is smaller with lines. It does not however explain, why, with the cone as the visual unit, the minimum separabile and the smallest perception width can be less than one cone diameter. The smaller minimum separabile with increasing broadness of the lines can be explained through increasing contrast between two bordering cones.

**DISCUSSION.**—Schoute pointed out that Koster, determining the visual acuity with the aid of a black point in a white field, determines in reality the minimum separabile between two bor-

der lines. And he asked if he understood rightly, that always one cone should remain without stimulation between two points, which one wishes to observe separately.

Roelofs answered that in the experiment of Koster the minimum separabile is determined between two planes, the extension of which cannot be lost sight of. The interlying cone is not always unstimulated while seeing separation, but always the observed separation corresponds with at least one perception circle.

#### **Late Detachment of Retina After Fall on the Head.**

G. F. ROCHAT was asked by an insurance company regarding a myopic patient, the connection between an accident to a person with low myopia, who fell from a wheel, striking the back part of his head, and detachment of the retina supervening a few weeks later. He concludes that it is certain that after indirect trauma, which does not touch the eye, damage of different kinds to the retina is possible, including detachment. It is also known that a detachment can become visible many months after a direct trauma, because the original changes are invisible in the beginning. This is also possible with a detachment through an indirect trauma.

**DISCUSSION.**—Halbertsma found in the beginning no fundus changes in a girl, who had received a tennis ball against her eye and who complained of metamorphopsia. Some weeks later riding in a jolting car she noticed a sudden diminution of her vision, which appeared due to detachment of the retina that Halbertsma considered dependent on the jolting of the body. Wolff feared that, often unjustly, a trauma is fished from the anamnesis, which undeservedly is considered guilty.

Reilingh asked if in this case arteriosclerosis was present. De Haas accepted connection in two observed cases. Nicolai considered the connection difficult to prove.

Zeeman could not accept a connection as proved, but certainly possible, and in the case even probable.

Rochat was interested to learn the

different standpoints in this practically important and difficult question.

### The Disease Picture of Blue Sclerotics.

J. VAN DER HOEVE demonstrated three members of a family in whom appear as hereditary anomalies, blue sclera, fragilitas ossium and otosclerosis. The bone changes were demonstrated with lantern slides. Heretofore only fragilitas ossium was known to be associated with the blue sclera. Dr. de Kleijn and the speaker could establish in a family of 22 members, in 4 generations, of whom 15 were examined, that ten times these anomalies were coupled with otosclerosis. An eleventh patient showed blue sclerotics and otosclerosis, but was yet free from bone fracture. A second family examined by the speaker in Groningen showed deafness with blue sclerotics and fragilitas ossium; indicating a connection between deafness and this disease complex.

The etiology of otosclerosis is still unknown and the question is whether the mesodermal tissue or the nervous tissue is primarily affected, or whether both are dependent on another cause. It is therefore interesting that the otosclerosis can appear as a part of an anomaly which can be explained by a poor disposition of the mesodermal tissue.

DISCUSSION.—Weve saw in the army a man with blue sclerotics, also suffering with otosclerosis, who had broken six times an arm or leg. Van der Hoeve mentioned that Peters considered this weakness of the bones a reason for exemption.

### Operation for Lamellar Cataract.

A. W. MULOCK HOUWER referred to the publication of Krueckmann in the 90th volume of v. Graefe's Archives. About the same method has been followed for years in the late Prof. Straub's clinic, and has proved satisfactory. The essential is that the lens nucleus is brought into the anterior chamber. Nucleus is used in the clinical sense, being the part of the lens lying within the opaque layer. The opaque layer is formed by insufficiently developed lens fibers. The slight cohesion

of this lenticular layer makes possible the separation of the surrounding mass from the enclosed part. Straub's method is as follows: After fixation at the nasal side, a straight or curved needle is introduced subconjunctivally, after maximal dilatation of the pupil. With movements in different directions in the pupillary space the anterior capsule is dilacerated as much as possible, with the anterior cortex. The point of the needle is brot around the nucleus above or below in the vertical meridian, with the intention of bringing the nucleus into the anterior chamber. It will not always be necessary to bring the needle point behind the nucleus. One presses the nucleus-margin backward and the margin of the nucleus at the opposite side appears in front, and the nucleus turns into the anterior chamber. This happens chiefly when the anterior cortex has been very freely dilacerated. In other cases it is necessary to bring the needle behind the nucleus and by sculling motions to bring it carefully forward. The operation being finished atropin is instilled and the eye bandaged. It may now be that the lens-mass swells and dissolves. As this substance is as much before as behind the iris, the chance for glaucoma is less. In spite of the large dissection, only in the minority of the cases, increase of pressure follows. If this happens it is not because the iris closes the irido-corneal angle, but because the very swollen lens-substance in the anterior chamber closes the filtration spaces. Besides the theoretical it has a practical value. The introduction of the keratome is easy and the danger of iris prolapse very small.

The lens substance is extracted after subconjunctival incision with the keratome through the limbus. The place of incision is the one which the patient offers with the least strained fixation. What is not removed over the keratome point is removed with a Daviel's spoon. One should not be tempted to do too much on account of danger of prolapse of the vitreous, especially when the posterior capsule has been wounded. This second stage of extraction will not always be necessary. If



glaucoma is not imminent the absorption may be left to nature.

The last period is a black pupil or a secondary cataract. With the discission the posterior capsule should be incised. The more widely the anterior capsule has been opened the less the chance for after-cataract. If secondary operation is not yet necessary the posterior lens capsule is seen in the pupil as a translucent, glossy membrane. Mostly after one to two years, the fine foamy membrane in the pupil is formed from small vesicles or droplets, which is easily incised. When the patient moves to a region where no ophthalmologic help can be had incision of the posterior capsule must be seriously considered. Twenty-six eyes were operated in the Amsterdam clinic during 1910-1916, in 15 patients, 11 of which were operated in both eyes. Some were too young for determination of the vision. Of the others the vision was after some years: 5 times  $1/3$ , 8 times  $1/2$ , 3 times  $3/4$ , and 5 times 1. The average time between the first operation and the prescribing of the glasses was 7 weeks.

The nucleus was brought into the anterior chamber in all cases except two. In one it came into the anterior chamber later spontaneously. In the other (the first case of the series), where only a large puncture was made, the extraction of the lens substance produced an iris prolapse, which had to be excised. Later glaucoma appeared which healed after sclerotomy. This case was the inducement later to carefully bring the nucleus into the anterior chamber. Removal of lens substance was done in 16 cases, 9 times on account of rise of tension. In 20 eyes, discission was performed 25 times. Indication for operative interference is a vision  $1/4$  or less. Once the operation was done with a vision  $1/3$  because the eye was myopic. The limit of  $1/4$  seems a little high, as it is insufficient for the better situated. For these the loss of accommodation weighs against the advantage of increased vision. For the lower class, the "unskilled loose workmen labor," the wearing of spectacles is an objec-

tion. In some cases operation might be delayed until the patient has chosen a trade.

**DISCUSSION.**—Dubois pointed out the rise of tension is less frequent with the old method. He thinks the operation quite difficult. It is not advocated for the myopia operation, as being less innocent. He prefers the less dangerous way. Blok stated that after a large discission, as he used to do, the nucleus comes by itself in the anterior chamber or can be brought there by massage. He only very seldom saw glaucoma. Faber preferred the most simple method, large splitting, after which much lens substance comes into the anterior chamber and resorbs without danger from tension or prolapse. Van den Borg leaves the resorption to nature, as time is of no consequence.

Snellen does not consider such an unusual manipulation necessary. After a large discission the nucleus always appears in the anterior chamber. He cautions against hurry. However, a too cautious puncture is not advisable, as this produces a troublesome thick secondary cataract thru inspissation of the lens. Verwey lets the aqueous humor out after puncture, which favors the displacement of the nucleus into the anterior chamber.

Mulock Houwer agrees that the rise of tension is greater with a large puncture than with very slight puncture; he did not mention prolapse of the iris. He noticed from the discussion that the members like to see the nucleus in the anterior chamber. His chief aim was to draw the attention to its value. He could not agree that the described method for furthering this is combined with special difficulties or dangers.

### **The Quick Phase of Spontaneous Nystagmus.**

G. F. ROCHAT mentions that little is known of the mechanism of the so-called spontaneous or amblyopic nystagmus. We have no certainty of the paths along which the impulse of vestibular nystagmus travels. The slow phase of vestibular nystagmus is caused from out the vestibulum, the quick phase goes over other paths, as



is known from observation of cases of supranuclear conjugate paralysis, where the slow phase of the caloric vestibular nystagmus can remain as a conjugate deviation, and the quick phase is absent. By experiments of Bauer and Leidel, where the quick phase of the caloric nystagmus still was present in decerebrated rabbits, it has become improbable that the stimulus reaches the ocular nuclei via the cerebrum.

The observation of cases of supranuclear conjugate paralysis has taught that the innervation of the quick phase for the optical nystagmus, which originates while viewing rapidly moving objects, follows another way than the slow phase, and that it probably originates in a similar manner as the vestibular nystagmus.

The innervation of the amblyopic nystagmus is entirely unknown, and also of the related congenital spontaneous nystagmus. The different theories agree that the nystagmus originates from impulses which continuously oppose each other and exercise their influence on the position of the eyeball, and which are suppressed by fixation. The cessation of fixation is then the cause of the nystagmus.

Rochat now relates some observations, from which it would follow that the fixation is rather the origin of the nystagmus. A 15 years old girl, with lamellar cataract and congenital nystagmus, had parallel position of the globes while seeing with both eyes, and "rück"-nystagmus toward the left. The static organ as far as could be detected was not damaged. If now the best seeing eye (right) was covered, the nystagmus toward the left would become a conjugate deviation toward the right; and both eyes remained quiet in the deviated position. It was here apparent that the nystagmus originated from the fixation, the quick phase therefore was excited thru the optic nerve, primarily, as a central disturbance of development. A poor balance for the lateral eye movement was present, thru which the rest-position was a conjugate deviation, and the nystagmus originated from the struggle between

this deviation and the fixation stimulus.

DISCUSSION.—De Kleijn warns against the schemata of Bartels, which start from the supposition that these reflexes pass through the cerebrum. After extirpation of cerebrum and cerebellum otogenous nystagmus still appears, the schemata are therefore insufficient.

Waardenburg suggested the need for a good method to register the nystagmus, and questions if it is known where the congenital nystagmus originates and if the influence of the labyrinth has been investigated?

Rochat mentioned different registration methods of Coppez, Abrahams, Ohm, Sackowitz and Struycken. They all can be improved. Little seems known of congenital nystagmus.

Waardenburg thinks that if good vision be necessary for the development of the nystagmus, it could not be explained in the cases of amblyopia and nystagmus. Rochat presumes here other causes.

#### Etiology of Uveo—Parotid Fever.

H. WEVE relates the histories of two cases of acute double parotitis, with months of swelling, combined with simultaneously appearing iridocyclitis. Lues, tuberculosis and pseudoleukemia could be excluded (this was not done by Heerfordt, 1909). In one case connection with epidemic parotitis was apparent. Probably Heerfordt's cases are abnormal cases of epidemic parotitis with an abnormal course. One of the patients had a recurrence 4-5 months after the first attack and was demonstrated at the meeting.

DISCUSSION.—Rochat saw in 1904 a similar case with tendency to recidives, so that one eye became very bad.

Hattink saw a similar case, which at first seemed severe, but under Fowler's solution progressed favorably.

Weve only treats symptomatically, when the course is benign. He thinks that the serum of patients, who had gone thru an acute epidemic parotitis, is curative, and intends to use this if the progress of the course is unfavorable. The vitreous opacities in the

case of Heerfordt suggested tuberculosis and this had induced him to try tuberculin treatment. (Speaker had later the opportunity to give the patient 40 cc. of serum from a patient who went through an acute epidemic parotitis 14 days previously. The result on the iris nodules meanwhile formed was not yet clear.)

Fuchs thinks, after observation of three cases of Mikulicz' disease, that these affections cannot be sharply separated. He mentions having observed some cases which clinically connect the cases as observed by Heerfordt, and the symptom complex of the Mikulicz' disease. He saw three cases where a swelling of the parotids and tear glands were combined with a double iridocyclitis. The first was a girl who suffered since some years with diarrhea, and who had a thick face since a short time, pain in the eyes and poor vision. The parotids and tearglands were distinctly swollen, and an acute iridocyclitis was present. After 8 or 9 months all symptoms had disappeared. The second case was a woman of 40, who came on account of poor vision. She had iridocyclitis. In its course after some months a hard swelling of both parotids and tearglands developed. She was nursing. The third was a woman of 47 years old, who suffered with chronic muscular rheumatism. Also here the hard swelling of parotids and tearglands appeared some months later than the iridocyclitis. The reaction of Pirquet was negative. In the two last cases vitreous exudation occurred, which reduced the vision below 1/10. Subconjunctival sodium chlorid injections acted favorably and brought vision back to nearly normal.

Weve states that Mikulicz' disease is tuberculosis, lues or pseudo-leucemia: these three he could exclude.

#### Neuro-retinitis arsenicalis.

H. K. DE HAAS, referring to his communication of May last, now speaks about 13 cases.

De Haas since has elaborated his experiences in another paper, an abstract of which will appear in this journal.

## CHICAGO OPHTHALMOLOGICAL SOCIETY.

Meeting of March 18, 1918.

DR. HEMAN H. BROWN, President, in the Chair.

### Severe Ocular Injury by Broken Spectacle Lens.

DR. WILLIS O. NANCE presented the case of Eugene C., aged 30, who, while working at the trade of machinist, on December 29th, 1917, was struck on the head by a falling ladder. He was wearing rimless spectacles. The right lens was broken and he sustained a horse shoe shaped incised wound of the conjunctiva, sclera and choroid of the corresponding eye. The wound occupied the inferior temporal aspect of the eye and extended from the limbus, approximately 8 mm. downwards and outwards.

He saw the patient at St. Bernard's Hospital about midnight of the day he was injured. Vitreous and shreds of choroid were protruding from the wound, and the iris drawn down into its lips. The protruding shreds were abscised. A firm bandage was applied and the patient kept in bed. He left the hospital January 14, and was under observation until February 10th, when he returned to his work. At the time of discharge, the vision in the injured eye was 20/50 minus. The wound healed splendidly and the cicatrized surface was smooth and regular.

The infrequency of such injuries is shown in the report of Hans Lauber, who states that he has only seen five cases in 150,000 eye injuries, or a proportion of but one to 30,000. His first case was seen after he had observed 85,000 cases of ocular injuries. After referring to other cases reported in the literature, Dr. Nance quotes from a report he presented to the Society 11 years ago in which he drew the following conclusions:

1. That injuries to the eye by broken spectacle lenses are extremely rare, and that the popular prejudice against the wearing of glasses by children, on the theory that the eyes are likely to suffer injury by the lenses being broken, while worn, is founded

more upon fancy than upon clinical evidence.

2. That wounds of the ocular appendage and surrounding parts by broken spectacle lenses, while not common, occur much more frequently than those involving only the eye itself.

3. That injuries of this character occur much more frequently among wearers of spectacles than nose glasses, probably for the reason that the latter being held less firmly before the eyes, are displaced by violence sufficient to break the lens.

4. That by far the greatest number of injuries result from the breaking of rimless spectacles, there being no instance in the author's series of cases where injury was induced by the rimmed variety of spectacles.

5. That injuries of the kind indicated are extremely rare in patients under 14 years of age, that they occur more frequently in females than in males, and that the wearing of veils probably holding the lenses more firmly in position upon the patient's face, has a tendency to increase the danger of injury.

Personal observation and the reports in the literature since that time do not lead the author to change his views.

DISCUSSION.—Dr. Frederick D. Vreeland stated that the case presented by Dr. Nance reminded him of one described by Dr. Ringueberg several years ago. From that standpoint, it was interesting to know the amount of injury that could occur by laceration of the eyeball and still prompt recovery take place. In the case of Dr. Ringueberg, the injury was greater than in this case of Dr. Nance, yet it healed kindly and the man returned to work in 16 days thereafter. This is largely due to the aseptic properties of the glass and the clean cut edges, as well as the approximation of the parts following the injury.

In deciding whether there still remains in the eye portions of glass, some have insisted on taking an X-ray picture, but the X-ray does not show very much if the glass is of the lead-free variety. Dr. de Schweinitz has de-

scribed a case in which a piece of glass remained in the choroid for ten years without causing any apparent irritation, showing that the eye would tolerate glass to a greater degree than some other foreign bodies.

As to rimless spectacles, the speaker also observed they were worn in the majority of cases, and that nose glasses did not occupy a fixed position and were easily knocked off. In most of the injuries previously reported the patients wore concave lenses which have thin centers. It is the sharp edges in the centers of minus lenses that produce laceration. Convex glasses are more protective. A large object striking an eye would produce serious injury independent of the lacerating tendency of the glass, while small objects are deflected by the presence of the lens. In a former report, contrary to what Dr. Nance had said, the speaker found that more men's eyes were injured in this particular manner than Dr. Nance had stated, and the ophthalmologists interviewed at that time were of the opinion that these eye injuries most frequently occurred in men who were engaged in industrial pursuits. The injury though was often the result of a household accident, or to those engaged in athletic sports. From an industrial standpoint a large majority are protected by lenses.

Dr. Thomas O. Edgar of Dixon, Illinois, speaking of these injuries of the eye from glasses, said that he could recall one case in his private practice, occurring a year ago. The patient, Sister B, bumped her face against the corner of a drawer breaking her rimless spectacles. She at once felt a foreign body sensation in her eye. She was found to have in the naso-central portion of her right cornea a 4 mm. vertical wound, penetrating deeply and obliquely to the surface. Although there soon developed a faint injection in the ciliary region the wound promptly healed and the recovery was uneventful. Her lenses were convex.

This afternoon he saw a second case (Mrs. A.) with an injury of the left eye of a type similar to that existing in Dr. Nance's patient shown this even-



ing. The woman was found by her family eight days ago on the floor in a convulsion. The left lens of her spectacles (which were of the ordinary gold rimmed type), was found to be shattered and her left eye bloodshot. It was thought her face had come in contact with the stove. The eye when seen for the first time this afternoon exhibited an ovate shaped pupil, having its apex adherent to the infero-temporal angle of the anterior chamber. The conjunctiva at this point formed a bulla 4 or 5 mm. in diameter but the iris did not present through the wound and there was no positive evidence of any break in the continuity of the conjunctiva.

A marked exophthalmos in this patient rendered her eye more liable to this sort of injury. One cannot be sure in this case that the spectacles, either lens or rim, caused the injury. A report ten days later showed recovery with corrected vision same as when tested a year previously.

Dr. Fred W. Bailey, Cedar Rapids, Iowa, recalled four cases he had seen in the last ten years. One of them was in a young girl, 8 years of age, who was wearing spectacles with rims. The injury was caused by a boy playing and striking the glasses with a poker at school, breaking the glass and cutting both corneas and iris. The other three cases were all adult men, and all of them wore minus glasses and were myopes.

Dr. Clark W. Hawley stated that his experience with injuries of the eye from broken spectacles was very small indeed. He had seen but one serious case. An insurance adjuster came to him with a history of broken spectacles, and he removed from the cornea several small pieces of glass. No scar was left. The wound was not deep enough to leave a scar. This was the only injury of the eye he had seen in clinic work or in private practice.

Dr. Alfred N. Murray said that he had reported a case to the Society two years ago of extensive injury to the eye from a broken spectacle lens. It was a golf ball accident, the patient wearing a minus toric lens of about

two and a half diopters. When the patient was brought to the hospital he had a corneal wound about four millimeters long with prolapse of the iris. This was excised, and about a week later, when the eye was quiet, he noticed an irregularity in front of the pupil almost at the center of the cornea, and on touching it with a probe found it was a piece of glass; it prolapsed into the flocculent lens matter which, since the injury, was present in large quantities in the anterior chamber. He extracted the glass by elevating it on the tip of a keratome, and introducing a forceps through the corneal wound, picking it out from the flocculent lens matter.

The cataract gradually became absorbed and left the anterior capsule attached to the posterior surface of the cornea. He incised this attachment with a knife needle and at the same time did a discission of the posterior capsule. At the end of a year the patient had 20/24 vision with the injured eye, which was certainly a good outcome considering the nature of the injury. Patient still had the strabismus which he mentioned at the time he reported the case. There still remained, after three years, a small spicule of glass at the site of the original corneal wound where the iris prolapse had occurred. This appeared to be more or less encapsulated, the eye was perfectly pale, and the patient had had no further trouble with it. He saw no reason for interfering with it.

He reported this case to show what an extensive injury can occur without losing the eye. It also showed what could be done in the way of conserving vision under such circumstances.

#### **Non-Pigmented Intraocular Neoplasm in an Adult.**

DR. NANCE exhibited a patient, 24 years of age, whose occupation was that of camera operator, he having been employed in this line of work for several years. Eight months ago, in Los Angeles one afternoon he was playing ball and noticed that he could not see very well, that things appeared to be blurred. Up to this time his sight

was pretty good. Shortly after noticing this blurring of vision he returned to Chicago. His mother told him that she noticed something white in one of his pupils. He secured a position in Chicago in which he was required to do considerable near work, and having some headaches he consulted the speaker on March 16. Up to that time no physician had examined his eyes.

The patient has an intraocular growth that seems to arise from the superior temporal aspect of the eye, probably from the retina or choroid, and extends downwards and to the nasal side. Apparently it is well circumscribed, of yellowish white color, and has several well defined blood vessels extending over it. Those members who had seen gliomata would recognize at once what appears to be a growth of that nature. As is known, glioma never occurs in adults. One man's guess was about as good as another as to what this growth is. Fuchs states that sarcomata of the choroid are almost always pigmented, and non-pigmented, so-called leucosarcomata very rarely occur. Whether this is a leucosarcoma or not he did not know. He would be inclined to give that as his best guess.

The growth is well defined. It is opaque on transillumination, and vision is nil. Patient is not able to perceive light. The case is very interesting. In his experience of nearly 20 years, with a rather large clinical experience of 13 years at the Illinois Eye and Ear Infirmary and in other institutions, and in his private practice, he does not recall having seen a nonpigmented intraocular growth in an adult.

DISCUSSION.—Dr. Vreeland said such cases were interesting from a diagnostic standpoint. As to the origin of this growth, from its location he was rather inclined to believe it sprang from the ciliary body. Growths from the ciliary body are not observed early as a rule, until they can be seen through the pupil. In one particular case he recalled the growth was situated on the choroid farther back, and he advised consultation. A diagnosis of intraocular tumor was made. Trans-

illumination was perfect. Needle puncture was resorted to which indicated there was a tumor present. There was more resistance than normal. He decided to trephine and see if the detached retina would go back into place, but the patient went back to Iowa and he did not have a chance to do it. He asked for an expression of opinion in regard to trephining in such cases.

As to Dr. Nance's case, he thought it might be called a leucosarcoma. The vascularity in these cases was variable. There was some vascularity in this case, but there did not seem to be any irritation of the iris. Growths springing from the ciliary body sometimes push forward and cause iris displacement, while syphilis and tuberculosis cause early iritis, which does not obtain in this case.

Dr. Clark W. Hawley stated that he had removed an eye which presented a picture very similar to the case related by Dr. Nance, but the growth proved to be malignant. When the patient first came to him he had vision in certain fields. Finally, vision was lost and he told the patient that he had a growth in his eye which might or might not be malignant. The probabilities were that he would be better off without that eye than with it. He would be inclined to hesitate in deciding whether this growth in the case of Dr. Nance was malignant or not. In his own case the tumor arose from the outer portion of the retina well forward and extended downward and inward. It was entirely retinal.

Dr. Oliver Tydings said that the report of Dr. Hawley brought up the possibility of whether this might not be a form of retinitis proliferans with a tuberculous base. The fact that it was nonpigmented would show that the growth did not arise from the choroid but was of retinal origin.

Dr. Nance stated that he had intended to say that tuberculin was given in his case and a Wassermann test made within the last ten days, both of which were negative.

Dr. Tydings stated that instead of making a von Pirquet test, he would start the patient with two milligrams



of tuberculin and see if he could not get a reaction. If he did not get a reaction he would give the patient three milligrams, and follow that with four, perhaps the next time with six, to see if he could not get a reaction.

With regard to trephining in cases of sarcoma, he did not know of any one who would advocate cutting into a sarcomatous growth. If there was a possibility of making a diagnosis ordinarily of melanosarcoma, the history would clear that up, and that would be in a case of trauma where one would have hemorrhage from the subretinal vessels. There one would get a tumor that looked like sarcoma. If one took the history of the case he could generally elicit trauma; and following on that, within a few months, one would have a blood clot settling down in the lower part of the globe, with detachment of the retina. He would hesitate very much to trephine in a case of sarcoma.

Dr. William A. Mann reported a case that turned out not to be a tumor, but a case where he made a diagnosis of glioma in an adult. The patient's eye had a similar appearance to that of the eye in the case of Dr. Nance, but there was no red reflex. The growth or mass seemed to lie back of the lens, pushing the lens forward. The pupil was slightly dilated. The eye was removed and proved simply to contain an umbrella detachment of the retina. The retina was folded in behind the lens.

Dr. Michael Goldenburg asked Dr. Nance whether he resorted to puncture with the hypodermic needle to see if there was any fluid present. (Dr. Nance replied that he did not.) From a hasty examination he judged that the vascularization was purely retinal. The mass was translucent. He saw a case a number of years ago similar to this which was presented by Dr. Parker and discussed by the elder Gradle. This looked very much like an intraocular tumor, but these cases were usually accompanied by intraocular tension. Sometimes this tension was absent. Lack of vascularization was rare in sarcoma. That it might be a well de-

fined detachment of the retina was possible.

As to trephining in these cases, he could not see any particular advantage of that over mere puncture with a hypodermic needle. If one should get fluid and the detached retina prolapsed, that would settle the argument. The trephine simply makes a larger opening.

The question of whether the growth was malignant or nonmalignant could only be determined after its removal and sections made. If it was merely a well defined detachment of the retina, it would exclude the possibility of enucleation. Sarcoma of the retina was exceedingly rare; he had never seen one, and they saw as many intraocular tumors at the Chicago Eye and Ear Infirmary as in any part of the world. These tumors usually spring from the tissues in the region of the ciliary body, or at the junction of the choroid with the disk. In other parts they are very rare. The translucency of the mass, the lack of vascularization makes one skeptical.

Dr. Robert von der Heydt related some of the experiences in relation to cases of intraocular tumor. Eleven years ago he refracted a girl whose vision was normal in each eye. Nine years ago he refracted her and could not raise her vision beyond 20/100 in one eye. On investigation he found melanosarcoma in the roof of the eye. This diagnosis was verified by Dr. Phillips and by Dr. Montgomery. Two weeks later he enucleated the eye.

Within the last two years he saw a case of detachment of the retina where there was a pigmented proliferation in the detached zone, there was reapplication and redetachment; and he had seen it go through three or four of such changes in the pigmented zone.

Within the last month he saw an interesting case of spontaneous detachment of the retina, with sudden, unexpected reapplication and absolute disappearance of the detachment, and again last week a redetachment. He was inclined to think in connection with Dr. Nance's case, in view of the possibility of sarcoma, its danger to



life, and because of the blindness, enucleation should be advised.

As to the value of the Wassermann test in this case, a positive Wassermann can be due to a malignant growth. In a nonsyphilitic, he has recently seen such a reaction due to a very small carcinoma on the tip of the tongue.

#### **Retrobulbar Neuritis Due to Syphilis.**

DR. THOMAS FAITH reported the case of a man aged 45, painter and paper hanger, first seen on Jan. 21st, 1918. Patient complained of losing vision for two or three months. R. V. = 6/200, L. V. = fingers at 3 feet. General health good except previous to 10 years ago when he suffered from rheumatism for a period of 2 or 3 years. Patient denies lues but has a distinct adenopathy and scar on penis; has been exposed to fumes of wood alcohol a number of times but never made sick or prostrated. For the past 5 or 6 years has been working as boss in a gang of paper hangers. There is no family history of blindness.

Both optic nerves have the appearance of a postneuritic atrophy; i. e., they are pale but not excavated. Patient complains of no pain but a feeling of soreness when he moves the eyes about, in extreme excursions. Has a well marked central scotoma for red and green in right eye; sees white yellow and blue in the central part of the field, but form field is contracted. In the left eye, sees only yellow, blue and white over a very limited area, to nasal side of the central fixation point. He can occasionally distinguish red with a 15 mm. square in the lower nasal quadrant about 15° or 20° from the fixation point. No symptoms of tabes or lead poisoning. Patient not a smoker, and only a very moderate drinker. Urine analysis negative. On January 4th, first fields were taken and condition above stated was found and charted.

Patient was put upon calomel  $\frac{1}{4}$  gr. doses for a few days. This was followed by a saline, and later Turkish baths on Jan. 29th. After two Turkish baths R. V. = 20/160, L. V. = fingers at 6 feet. K. I. then ordered. Be-

gun with gr. x and increasing to gr. xxx t. i. d. Patient seen again Feb. 4th. R. V. = 12/20, L. V. = fingers at 5 feet; sent to Michael Reese Hospital. On Feb. 6th, complete nervous examination by Dr. Sidney Kuh, who reported nervous system negative. Wassermann made at this time showed blood ++; spinal fluid + + + +; count normal. At this time R. V. = 7/200, L. V. = fingers at 3 feet. Patient put on inunctions of 5i of ung. hydrarg. per diem; also saturated solution of K. I. beginning with drops xv and increasing 3 drops each day. This was continued for six days, when 6 gm. novarsenobenzol was given intravenously. Vision seems slightly improving. On Feb. 17th, R. V. = 13/200, L. V. = fingers at 6 feet.

We are all more or less familiar with the typical toxic amplyopias, the chief symptoms of which are reduction of vision, with relative central scotoma, with or without ophthalmoscopic changes. The ophthalmoscopic changes when present usually only amount to blurring of the disk margins and pallor of a sector of the temporal side of the nerve head, when the case was recent, or which might give the entire disk an atrophic appearance if the case was an old one.

Authorities state that hereditary optic atrophy may occur either with or without central scotoma; that multiple sclerosis frequently has as one of its symptoms a retrobulbar neuritis, and that atrophy with or without central scotoma may be one of the very earliest symptoms of tabes or general paresis, sometimes antedating all other symptoms by many years.

Nonne records the existence of retrobulbar neuritis in syphilis and calls attention to the fact that the disease does not necessarily run a uniform course in both eyes. Alexander states that these cases are usually cases of perineuritis affecting the periphery of the optic nerve and thereby causing the central disturbance, since the peripheral fibers go to the macular region. Real cases of retrobulbar neuritis, if unrelieved, degenerate into atrophy; and Nonne among others, believes that

cases of isolated optic atrophy of luetic origin do occur, which never do develop into tabes, general paresis or multiple sclerosis. But this can always be questioned. The question that naturally occurs to one in the presence of such a case is: Is this case one of retrobulbar neuritis resulting from the toxemia of lues, or is the optic nerve lesion but the forerunner of one of the

grave diseases of the central nervous system which occur in syphilis?

DISCUSSION.—Dr. E. R. Crossley stated that a retrobulbar neuritis, with a few exceptions of direct infection, may be said to result from an acute or chronic absorption of toxins, generated either within the body or coming from without.

#### DIFFERENTIAL ETIOLOGY.

Acute Retrobulbar Neuritis.	Chronic Retrobulbar Neuritis.	Toxic Amblyopia.
Absorption Acute.	Chronic or continued.	Chronic or continued.
Toxins generated within body.		
Toxins of infectious diseases.		
Acute diseases.	do.	
Influenza, Diphtheria, Malaria, Scarlet Fever, Rheumatism, Syphilis.	do.	do.
Injuries to the orbit and extension of inflammations and diseases from the accessory sinuses.		
Chronic diseases.	Chronic Diseases.	Chronic diseases.
	Uremia of Nephritis, Malaria, T. B., Auto-Intoxication, Diabetes and Syphilis.	do.
Absorption from without the body.	Alcohol and Tobacco.	do.
Drugs, Chemicals and Metals,	Lead, arsenic, carbon-bisulphide, iodoform, quinin, wood alcohol, nitro and dinitro-benzol, cannabis indica.	do.
Alcohol and Tobacco,	Uncertain vision.	do.
Lead.	Reduced central vision.	do.
	Central Scotoma for Red.	
Disseminated Sclerosis.	do.	
Acute Myelitis.	do.	

#### DIFFERENTIAL SYMPTOMATOLOGY.

Acute Retrobulbar Neuritis.	Chronic Retrobulbar Neuritis.	Toxic Amblyopia.
Vision.	Gradual loss.	
Rapid loss.	Central Scotoma for Red and Green—Relative or absolute.	
Loss may be partial or complete (1 week).		
Pain.	Not present.	Not present.
In orbital region and on pressure and movement of the eye.		
External appearance.	Unchanged.	
Unchanged.		
Ophthalmoscopic examination.		Unchanged.
Hyperemia of nerve head and hazy disc margins.	Nothing abnormal in earlier stage.	
Constricted arteries and distended veins.	Later temporal side of disc is pale.	
Central Scotoma, early course.	Central Scotoma Later, Diminution of field and scotoma may persist.	Rel. Cent. Scotoma Later.
Vision may return to normal or remain much impaired.		Diminution of field and scotoma may or may not persist.
Papillo-Macular Bundle of fibers in early stage are involved—may involve entire field.	Papillo-Macular Bundle of fibers involved later stages.	do.
		do.
		do.

Dr. Crossley stated that sudden changes in vision characterize acute attacks. These attacks may take place within a few days to the extent that all perception of light is absent. A dull pain in the orbital region is a characteristic symptom, and pressure on the eyeball or any movement of the eye by the patient tends to aggravate the symptom. Acute attacks are more commonly unilateral and may come from direct attacks of infection, as in the orbital infections, possibly from some of the acute infectious diseases.

The vision fails gradually in the chronic form of retrobulbar neuritis and varies from a slight disturbance to an entire loss of central acuity according to the scotoma. As a rule, there is more disturbance for color than for form, therefore, the characteristic scotoma for red and green. In later stages of the disease the scotoma which was at first relative, becomes absolute and increases, involving the peripheral field. In the central scotoma the red and green colors are the first to disappear. In most cases the central portion of the field is affected or that part supplied by the papillo-macular bundle of nerve fibers, although in an occasional case complete blindness may develop. A retrobulbar neuritis is an early symptom of disseminated sclerosis.

The treatment of these cases is the treatment of the disease causing the neuritis, and the withdrawal and elimination of the toxin producing it.

DISCUSSION.—Dr. Nance stated that every ophthalmologist came in contact with cases of retrobulbar neuritis of obscure origin. Dr. Crossley had mentioned some 20 diseases that might be responsible for retrobulbar neuritis. The speaker desired to mention one case that came under his observation within the last six months, and he hoped that at some future meeting of the Society he would be able to report it in detail. The patient was a man, 53 years old, a newspaper writer of national reputation, who, after attending a baseball game the latter part of October, noticed the next morning that his vision was very much reduced.

This reduction in vision increased from that time until the following morning when he was absolutely blind in both eyes.

Ophthalmoscopic examination showed the media perfectly clear. Three days later neuritis developed in one of the eyes; there was quite marked swelling of one of the discs which, within two or three weeks, became very pale and there was distinct atrophy.

For a period of ten days the patient was absolutely blind. There was no perception of light. At the end of about the tenth or eleventh day a little vision returned, and about a week or ten days later he was able to read; he had about 15/200 in the eye in which there had been no ophthalmoscopic changes. In the eye showing atrophy vision was afterwards fingers about three or four feet.

The man gave absolutely no history of any of the poisons that were usually looked for as productive of this condition. The Wassermann test was absolutely negative. The tuberculin test was negative. The patient had a number of healthy children, all of good habits; and the only cause that the speaker could attribute the trouble to was the possible one of so-called autointoxication. Following this ball game the patient and two or three of his friends went to a restaurant in a down town district and ate a large steak two or three inches thick, with some boiled cabbage, drank two or three glasses of beer, and really made a hearty dinner. Whether this had anything to do with the production of an acute systemic condition like this he did not know.

Patient was under observation for three weeks a part of the time in the hospital, where he was examined by Dr. E. B. Hutchinson, Dr. Archibald Church, Dr. Kanavel and one or two other observers. Shortly after this the patient left the city and had been visiting with his son in Kansas City. As soon as the patient returned to the city again, he would try and get his field of vision and present the history of the entire case to the Society.

Dr. Oliver Tydings said that Dr. Crossley in his citation of causes left



out one of the most important, namely, next to syphilis in the production of retrobulbar neuritis was tubercular conditions. The diagnosis in some cases of retrobulbar neuritis is exceedingly difficult. In one of the first cases that came under his observation the cause was tubercular. The patient was a woman whom he saw when engaged in general practice. He operated on her for hemorrhoids, and in the course of this work he was requested to make a vaginal examination to see what was in the pelvis, as undoubtedly there was some disease located there. The woman was almost exsanguinated from the loss of blood from the bleeding hemorrhoids. He advised operation later.

He did not see any more of this woman for some years. The next time he saw her he had abandoned general practice and was going east to see his father who had been taken ill. He advised the woman to consult a surgeon. This she did, was operated on, and the report from the surgeon was that she had a tubercular right tube and ovary. Three or four years later the patient came under the speaker's observation with retrobulbar neuritis of tubercular origin, she had recovered under tuberculin therapy. He had not seen the patient since, but he sent her to a local oculist, she was treated by him, and made a good recovery under the use of tuberculin.

With regard to the Wassermann test, he was somewhat skeptical. He cited cases which destroyed his confidence in the Wassermann test. He recalled a case (which was also seen by Dr. Faith) of retrobulbar neuritis associated with other ocular conditions, in which he in consultation with another was advised to remove the eye, the consultant believing the condition to be malignant. There was a swollen disc. The test for tuberculosis gave a reaction of one and a half degrees. The patient was put on tuberculin, got well under it, and has better than 20/30 vision in the affected eye.

Dr. Michael Goldenburg regretted that Dr. Faith was unable to show his case; because he was undecided from the description whether it was one of

retrobulbar neuritis, toxic amblyopia or postneuritic atrophy. The speaker's conception of retrobulbar neuritis was that there were no ophthalmoscopic findings early, but later one could note paleness of the disc at the lower outer quadrant, the region occupied by the papillo-macular bundle. In that event one would get a central scotoma for red and green, if due to alcohol or tobacco or in disseminated sclerosis. There was hardly ever or never congestion or tortuosities of the blood vessels in retrobulbar neuritis or toxic amblyopia.

One could have disturbances of the color field in neuro-retinitis if vision was bad enough, because red and green were the first colors to be lost so that central scotoma for red and green was possible. If it was toxic amblyopia, it was purely a parenchymatous degeneration. If it was a neuritis luetica it was interstitial. In interstitial neuritis antiluetic treatment would be of extreme value. In toxic amblyopia, degeneration of the parenchyma of the nerve fibers, there would be little or no improvement under antiluetic medication. If it was a toxic amblyopia on top of a luetic neuritis, the treatment for lues was indicated.

The treatment for toxic amblyopia was essentially abstinence from the use of tobacco and alcohol. Injections of strychnia in conjunction with nuxvomica per orum were of doubtful value. He had seen many cases get well without the local treatment. A combined condition was not uncommon. An individual, who was susceptible to excesses of alcohol and tobacco, was susceptible also to disease resulting from immorality. True cases of toxic amblyopia have a facies that is characteristic. The eyeball was not normal externally; the sclera was yellowish; the conjunctiva was yellowish, congested and appeared rough. A low grade inflammation was present in the conjunctival vessels, and by lifting the conjunctiva one would find the deeper vessels of the sclera somewhat injected.

Treatment advocated for primary optic atrophy of late was so extensive and varied, and in such a state of chaos

at the present time, that one hardly knows what to do or say. Fuchs definitely states that primary optic atrophy usually grew worse under antiluetic treatment, yet it was resorted to right along.

Dr. Faith, in closing, stated that if toxic amblyopia was kept up for any length of time the patient would have retrobulbar neuritis, and if retrobulbar neuritis was kept up long enough there would be a secondary atrophy; it would not be the gray atrophy such as one would see in tabes. The very earliest thing to appear in some cases of general paresis of syphilitic origin was a retrobulbar neuritis. The question arose, did the retrobulbar neuritis begin by poisoning the neuro-macular bundle by the toxins of syphilis, or did it begin as a neuritis? So far as looking at the eye and examining the fundus was concerned, he did not believe any one could tell the difference except that retrobulbar neuritis was followed eventually by pallor of the whole disc, if the retrobulbar neuritis went on. If one was able to arrest the process, it would end there.

In the treatment, if the toxic substance or substances were not removed, whatever they were, one could not hope to bring about a cure.

MAJOR H. WORTHINGTON,  
Secretary.

## COLORADO OPHTHALMOLOGICAL SOCIETY.

February 16, 1918.

Dr. H. R. Stilwill, Presiding.

### Results Following Pterygium Operation.

Dr. C. E. Walker presented Prof. C. O. H., upon whom he had performed a pterygium operation at the outer and inner limbus of each eye. V. O. D. 20/20 with + 2.50 sph.  $\ominus$  + .75 D. Cyl. Ax. 20°. V. O. S. 20/20 with + 2.50 D. sph.

Dr. Walker operated by shaving the pterygium from the cornea and undermining the pterygium so as to push it back toward the canthus as far as possible. He then undermined the conjunctiva above and below and made a

short vertical incision in the conjunctiva adjoining the limbus above and below. Three sutures were placed in the conjunctiva to bring the horizontal edges, made separate by the removal of the pterygium, together. He put in another stitch so as to bring the conjunctiva over the retracted tip of the pterygium. This produced atrophy of the pterygium and kept it from growing back over the cornea.

**Discussion.**—Dr. Melville Black emphasized the importance of removing all of the pterygium from the cornea in each case we operate upon. He said he always shaves the tip of the pterygium off the cornea and includes some of the corneal tissue in this if necessary. He believed too many surgeons leave some of the tissue on the cornea and do not get the results they would otherwise obtain.

Dr. G. F. Libby said that several years ago he did an operation similar to the one described by Dr. Walker. By divulsion he cleaned off the pterygium by using a modified squint hook for this purpose.

Dr. W. H. Crisp stated that the pterygium extends into the substantia propria of the cornea, so that we can't remove all of this without producing a scar. He feels that it is impossible to have a perfectly clear cornea after any pterygium operation.

Dr. J. A. McCaw said that he had seen a number of Dr. Black's cases following the pterygium operation, and it was impossible to detect any scar of the cornea.

Dr. C. E. Walker, in closing the discussion, referred to a case of opaque cornea, after a pterygium operation, and said, so far as he knew, all cases have some corneal opacity; altho he believed we should make every effort, as Dr. Black suggested, to reduce this to the minimum.

### Ophthalmia Nodosa.

Dr. J. A. McCaw presented Mr. A. F., age 28. When he was seven years of age, a caterpillar was thrown into his left eye by a playmate. The eye became inflamed and very painful. Two days later a physician removed



some of the hairs. The eye was not used for seven months. At the end of this time the patient said he had light perception only. For a year and a half the eye was quiet, when all of the former symptoms returned. The doctor attempted to remove more hairs. The eye was sore for three months at that time. He had the third attack one year later. The eye remained quiet until he was 12 years old, or three years. At that time his attack was the worst of all, lasting a year. Two years later he had another which lasted 5 weeks, and in two years another which lasted two months. After a period of quiet for three years he had a severe attack, then another in 4 years, and then the last one. During these attacks he had all the symptoms of an iritis. Wassermann was negative.

DISCUSSION.—Dr. Edward Jackson said the diagnosis of ophthalmia nodosa seemed probable even after 20 years; altho one naturally thought of the possibility of some other etiology. In this case the posterior synechia was broad, and it looked as if one of the lesions, with a caterpillar hair in it, was situated in the synechia. Reis, in at least one case, has excised a nodule and demonstrated a caterpillar hair in the nodule. He further stated that the corneal haze, in this patient, was deep in the corneal tissue.

Dr. Melville Black stated that an iridectomy may be of advantage. He would excise the posterior synechia, as it will break loose in this way rather readily, and this might relieve future attacks, especially if there were a nodule in the posterior synechia containing a caterpillar hair.

Dr. W. H. Crisp mentioned the fact that caterpillar hairs have barbs or beards upon them, so they are apt to change their position from time to time and this was a source of irritation to the delicate tissues of the eye. He believed, under such circumstances, that any irritation of the eye, from general conditions throughout the body, can more easily produce inflammation of the eye than if such an eye were free from caterpillar hairs.

### Postoperative Congenital Ptosis.

DR. D. H. COOVER presented Mr. C. M., age 21, following an operation, by the Tansley-Hunt method, for congenital ptosis of O. S. Twelve years ago this patient, a ranchman, was kicked by a horse over O. S., which produced a complete ptosis. Since that time he has been unable to raise the lid. The eye turned in about 5 mm. owing to the loss of power in the external rectus. The outward movement extended to the median line; the movement upward and downward was very slight. Vision nil; lens cataractous, and dislocated backwards into the vitreous. The commissure was very narrow.

Since the operation the lid has remained up; the palpebral opening was almost equal to that of the right eye; and, the eye can be closed equally as well as the other one. Ten days after the Tansley-Hunt operation he tenotomized the internal rectus and advanced the capsule of the external rectus, with the conjunctiva, which corrected the squint. The patient had an excursion outward as well as inward, and some movement of the eye up and down.

DISCUSSION.—Dr. Melville Black said we should dissect off all the skin from the pedicle used in doing the Tansley-Hunt operation. Thru some oversight this was not emphasized in Wood's Encyclopedia of Ophthalmology. Rather recently he had had the pleasure of seeing two cases operated by Dr. A. E. Davis, of New York City, and he incised entirely thru the upper lid in doing an operation for congenital ptosis, and excised completely the semilunar area in the upper lid, the size of which was determined by the amount of ptosis to be corrected. The edges were then sutured with black silk. Dr. Davis has obtained good results by this operation.

Dr. C. E. Walker stated that we should use the frontalis muscle if we expect to get the best results in any case of congenital ptosis. He also favored excising a section of the orbicularis muscle. If necessary he lets the operation for excision of the orbicularis muscle heal; and then forms



pedicle and sutures it in place, as he can sometimes get a better result by doing this as two operations instead of one.

### **Result Following Extraction of Steel from Vitreous.**

DR. W. C. BANE presented Mr. C. A. C., age 27, boiler maker. On January 3rd, 1918, a fellow workman struck an expander with a hammer and a chip of metal struck O. D. On January 4th, the vision was "hand as object at one foot." There was an oblique cut in the lower nasal quadrant of the cornea 4 mm. in length and a rent in the margin of the iris. The lens capsule was broken and the lens partly opaque. The visual field was manifestly good. The test with the sideroscope was negative. The X-ray located the foreign body 15 mm. back of the center of the cornea and 6 mm. above the horizontal meridian. Under local anesthesia the foreign body, a bit of steel 1x4 mm., was removed by the hand magnet, thru an incision into the eyeball at the temporal margin of the superior rectus muscle and 12 mm. back of the cornea. Very little reaction followed the operation. The lens has partly disappeared since the removal of the steel and vision equaled good light perception and projection, with slight circumcorneal injection six weeks subsequent to the injury.

DISCUSSION.—Dr. Melville Black said he didn't believe the lens was being absorbed, even though the light perception, according to Dr. Bane, was better than a month ago. The cataract could not be absorbed without some further operative intervention. He would not stir this eye up, by needling it, as there was some injection. But he would use atropin until the eye has become quiet, and until after all the medical and surgical treatment has been carried to completion.

Dr. C. E. Walker said when a lens has been injured by a foreign body, such a patient should be watched because of the danger of secondary glaucoma. He would seriously consider the extraction of the lens if the tension

tends to become elevated. He would not interfere so long as the patient does well under the former treatment.

Dr. Black said the injured lens will keep up a slow uveitis with diminished tension. This should be avoided if we are to obtain the best results. He was in favor of making a corneal incision, opening the lens capsule, and washing out all of the lens debris, so as to finish this at one time, as soon as the eye will permit.

### **Corneal Ulcer.**

DR. BANE presented Mr. E. A. B., age 26. The left cornea was injured 2 years ago by a bit of steel. An opaque spot, below the center of the cornea, remains. About Jan. 26, 1918, 3 weeks after acute rhinitis, the opaque spot broke down. A leash of vessels from the lower margin of the cornea extended into the ulcer. The ulcer was inclined to spread and was slow to yield to treatment. Finally it was stimulated to heal by applications of 2% yellow oxid of mercury. There was a history of tuberculosis.

DISCUSSION.—Dr. Melville Black said he saw this case, in consultation, the next day after the yellow oxid of mercury ointment had been used; and he thought the cornea was anesthetic, but it proved not to be. The corneal nutrition was good, due to the leash of vessels extending from the limbus to the ulcer.

### **Superficial Corneal Haze.**

DR. BANE presented Mr. P. J. O'M., age 27, fireman. On February 9th, 1918, he developed a shallow marginal ulcer on the upper nasal quadrant of the left cornea. V. O. S. 20/40. From day to day there has been a change in the broken epithelial layer as it stains with fluorescein. There has been very little irritation of the eye. The interest has centered in the changes in the corneal epithelium. The conjunctiva has not been healthy.

DISCUSSION.—Dr. F. R. Spencer stated that this was a case of epithelial dystrophy, as the haze was very superficial and took the stain so as to demonstrate that only the corneal epithelium was involved.

### Scleral Tuberculosis.

DR. H. R. STILWILL presented a woman, age 52, mother of ten children, with the following history: Last April O. S. became red and painful, with diminished vision and photophobia. The corneal opacity has remained since. She was treated by a general practitioner, and no further record of the case has been obtained. V. O. S. 1/60. A few vessels were present and one pin point deposit, probably of calcium, showed in the cornea. Six weeks ago O. D. became inflamed. There was a scleritis entirely around the limbus. The cornea was hazy and the iris muddy. There were posterior synechia, with a slight exudation in the pupillary area. The tension was approximately  $-1.5$ , but the eye was not tender.

DISCUSSION.—Dr. J. A. Patterson said this inflammation must be due to some general disease. He was impressed by the diminished tension of each eye. He would seriously consider tuberculosis, and treat it as such.

Dr. H. R. Stilwill said this was rather a typical sclerosing keratitis, as described by Fuchs, and that Fuchs gave as causes congenital lues, tuberculosis, rheumatism, etc.

Dr. C. E. Walker said he had had a lady patient, age 23, with an attack of scleritis with posterior synechia. Tuberculosis was the only cause found. Later the other eye had iritis with focal points in the choroid. Under tuberculin, the inflammation entirely disappeared. He thought it advisable to do an iridectomy when the eye has become quiet.

Dr. W. H. Crisp said from the general appearance he thought this was very suggestive of tuberculosis. There was a small round cell infiltration, and it was probably not a case due to focal infection. He believed that we should not consider the clinical picture so much. We should not make our diagnosis based upon the clinical picture, but rather upon the etiology.

Drs. Patterson and Black each emphasized the importance of the administration of tuberculin, at least, for diagnostic purposes.

### Uveal Tuberculosis.

DR. MELVILLE BLACK made a subsequent report upon a case of uveal tuberculosis, shown at the January meeting. See March No., p. 341. Two days after the January meeting, the tension was greatly elevated. The atropin was stopped and eserine used. The pupil remained dilated, however. He used a subconjunctival injection of sodium citrat, but this was followed by an intense reaction. He wanted to do iridectomy, but knew this would be very difficult under the condition the eye was in. The high frequency current was used, for 30 minutes, but to no advantage in lowering the tension.

Dr. Edward Jackson saw this patient in consultation and advised an iridectomy. This was duly performed and the incision was made with a keratome.

Immediately the anterior chamber completely filled with blood, and it was impossible to see the iris. The forceps were used three times in an attempt to draw the iris out through the wound, but each time the attempt was unsuccessful. The blood clotted promptly and was so thick it could not be washed out of the anterior chamber. Finally, with the fourth attempt, Dr. Black succeeded in removing a piece of the iris as he happened to be, this time, assisted by Dr. J. N. Foster who suggested placing the forceps at a little greater angle. The next day the tension was elevated as before. Enucleation was seriously considered by the patient's husband, a physician, and Dr. Black. On the second day after the operation, however, the tension was reduced. The blood in the anterior chamber had been partly absorbed and the iris was found to be present in the wound at two points. However, this may be an advantage in aiding drainage.

DISCUSSION.—Dr. C. E. Walker said it was very difficult to do an iridectomy in such a case. We should use the small cataract knife of Lamb's, and he did not approve of the keratome.

Dr. Black said posterior sclerotomy is often a failure, because of the massive vitreous hemorrhage which defeats our purpose.

FRANK R. SPENCER, Secretary.



# WILLS HOSPITAL OPHTHALMIC SOCIETY.

Meeting of April 2, 1918.

## Permanent Hemianopsia Following Migraine.

DR. WILLIAM CAMPBELL POSEY gave the notes of a series of cases in which permanent quadrant and hemianopic lesions followed so-called migrainous attacks.

Case 1.—Mrs. H., age 40. Two years prior to consulting the writer after a rather prolonged strain upon her eyes at near work, and while she was suffering from intestinal toxemia, she suddenly lost one-half of her visual field. As far as can be ascertained, the outer half of the right field of vision was at first destroyed. But after a few days, peripheral field cleared, and the loss was limited to a small section at the fixation point in each eye; so that when she read she could see but the first half of words, and experienced great difficulty in seeing any small objects upon her dressing table.

This interesting case has been at various times under the care of competent ophthalmologists and internists, but despite all the eliminating measures which have been undertaken, the central loss in her field of vision remains unaltered. Her error in refraction consists of a low grade of hyperopic astigmatism, and with proper glasses vision is normal in each eye. Her extraocular muscle balance is also normal. The eye-grounds are negative. Her fields of vision show no limitation in the peripheral field, but definite hemianopic defects at fixation in each eye, the scotomatous areas extending from fixation to the right.

The patient has always had a poor digestion and for years has been under care for intestinal toxemia. Prior to the attack which resulted in the permanent loss of vision, she had repeatedly suffered from migrainous seizures, always associated with head pain. Scintillations of light accompanied some attacks, in others hemianopic blindness was the only symptom present. At times the blind areas would be on the right side, at times on the left. As far

as she could remember, tho there had been repeated attacks of sick headache, there had been no visual obscurations since the permanent areas of hemianopic blindness manifested themselves.

Case 2.—Mrs. E., age 46. Subject to migraine for many years. Following an unusually severe attack, there had persisted a right lateral homonymous defect in the upper quadrant of the fields of vision in each eye.

Case 3.—Mrs. B., age 33. Right homonymous hemianopsia with preservation of a small area in extreme periphery of the right field followed by a severe attack of pain in the left side of the head, and accompanied by loss of sensation and motion in the right arm and leg. Sensation returned in the paralyzed side about two hours after the attack and motion some time later, but the visual defect persisted.

Dr. Posey referred to a number of other cases which he had found in the literature on this subject and to which he had referred in a paper before the Section on Ophthalmology of the Baltimore City Medical Society in 1915.

Dr. Posey said that there is ample evidence in the literature to the effect that migraine may be the inciting cause of organic brain disease, and that an area of softening of the brain may follow, which may manifest itself by a permanent paralysis, aphasia or hemianopsia. While such lesions usually occur in individuals who are predisposed in consequence of disease of the walls of the blood vessels, it would seem that in certain cases the vascular lesions may occur in young persons and even in some adults with healthy vessels. Caution, however, must be observed in ascribing even an exciting role to migraine in cases of organic brain disease, as it is not unlikely that independent disease of the blood vessels is responsible for the resultant symptoms, and the migraine merely coincident.

As bearing upon Case 1, Dr. Posey gave the notes of another case already reported by him, in which right homonymous hemianopsia, which was confined to the macular regions, followed an apoplectiform seizure in an



arthritic male 50 years of age. He recalled that this defect in the visual fields in association with cerebral disease was first called attention to by Mills, in 1898; and that Wilbrand, in 1907, reported eight cases observed by him and gave a detailed analysis of the condition. This latter author is of the opinion that the scotomas under consideration appear when an end artery in or near the cortical center of the visual area becomes occluded, and believes that the calcarine artery is the vessel chiefly involved.

Dr. Posey also gave the notes of a case of recurrent oculo-motor palsy, or ophthalmoplegic migraine (Charcot), which had recently been under his care. This unusual affection of the central system occurred in a girl 13 years of age, the first attack with implication of the eye muscles occurring when she was but 6 years old. According to the statement of the mother, the first attack was attended with severe head pain, following which the left eyelid drooped and the patient complained of double vision. The left eye also deviated outwards. There had been five recurrences of these symptoms, the paralysis in each instance passing away in from 10 to 14 days. No unusual visual phenomena attended any of these attacks. Her general health has been poor and an examination of her blood revealed marked chlorosis.

Dr. Posey referred to a second case reported by him and Dr. Spiller in 1905, namely, that of a physician 31 years of age, who presented almost complete ptosis of his right upper eyelid and a paretic condition of the inferior oblique and the internal rectus muscle of the same eye. His ocular symptoms dated from 14 years of age, when the patient began to suffer from spells of dimness of vision, associated with flashes of light upon the side, and followed by headache and nausea. These seizures apparently were typical attacks of migraine. They occurred upon both sides of the head and were brought on by gastric disturbances, overuse of the eyes, and general fatigue. At the end of two years the character of the attacks changed as the spectra disap-

peared, tho the pain in the head and the gastric symptoms still persisted. While in attendance at the medical school, the pain in the head was almost constantly present, especially over the right eye, which led him, as mentioned above, to seek relief from glasses. His health is otherwise good.

Ten months before he came under the observation of the speaker, after continuous professional work of more than usual severity, following an attack of pain in the right eye which had persisted for a few days, he saw double for the first time. He is unable to say whether the attacks of migraine had been more aggravated just prior to the attack of diplopia than usual, but he is confident of the preceding pain in the eye without the migrainous symptoms. At the time of the attack the double vision was more marked when he looked to the left and above, but there was no ptosis. This diplopia persisted several weeks and then gradually passed away, leaving no apparent ocular disturbance, his eyes giving him no further trouble until July, when a return of the double images was again remarked. The double images were of much the same character as in the preceding attack, but there was the additional symptom of the drooping of the upper lid of the right eye. At first the ptosis was intermittent, but in the course of a few weeks it became permanent and almost complete, until November 1st, when the lid raised for several days, but dropped again, however, and the eye remained closed until November 24th, when the lid again raised and resumed its natural appearance and so continued one week, when it began to partially droop, in which condition it still remains.

On account of the unusual course of the palsy, the attack of diplopia six months previous to the onset of the present palsy being also occasioned in all probability, as judged by the position of the double images, by an involvement of the right oculomotor nerve, it was thought best to ascertain whether there existed any further involvement of the nervous system. The patient was accordingly examined by one of

us (Dr. Spiller), who found that he closed his eyelids well, drew up the corners of his mouth fairly well together, but not very well separately. The tongue was protruded straight, was moved freely, and showed no fibrillary tremors. The masseter contracted well on both sides. Sensation for touch and pain was normal in the two sides of the face.

He had no weakness of the limbs. The patellar reflexes were prompt but not excessive, and the right was a little prompter than the left. The Achilles jerks were prompt but not excessive, and he did not have ankle clonus. Sensation for touch and pain was normal in the hands and feet. The gait and station were normal with the eyes open or closed. He had possibly an area of slight hypalgesia on each side of the thorax about the nipple line; this, however, was not positive, and tactile sensation here was normal.

The patient when questioned gave further information regarding the attacks that he had had when he was about fifteen years of age and later. In these he would become completely blind, and would not recognize an object across the room, although he could see light faintly. These attacks lasted about half an hour, and were followed by severe headache. During the blindness he saw flashes of light. The blindness disappeared before the headache developed. He had not had any of these attacks during the past ten years.

Dr. Posey referred at some length to the literature on the subject of oculomotor palsy and said that Möbius assumes that the lesion is at the base of the brain and combats Charcot's opinion that the periodic oculomotor palsy is a form of migraine (*migraine ophthalmoplegique*), and he believes the migraine is only symptomatic, as it may be in epilepsy or in parietic dementia. Migraine may cause oculomotor palsy, but in periodic oculomotor palsy the lesion causes the palsy and the migraine is an aura. How migraine may cause the palsy is unknown. In most cases of periodic oculomotor palsy the paralysis occurs in the first attack.

In the cases in which a necropsy has

been obtained, basal hemorrhagic pachymeningitis was found in one case, a tubercle, a fibrochondroma, and a neurofibroma in others. Oppenheim thinks that the periodic oculomotor palsy is related to migraine, as Charcot believed, and dependent upon vasomotor disturbance. Spasm of the vessels obstructs the blood supply and causes the paralysis, or overfilling of the vessels compresses the nerve. Attacks may occur without permanently injuring the nerve, but finally degeneration and inflammatory changes occur in the nerve and the paralysis persists. Such vascular disturbances may cause exudative processes or tumor. The symptoms may be progressive, or may be arrested, or may disappear.

In the report of the case cited, Dr. Spiller pointed out that some very important distinctions will be noticed between the descriptions of Möbius and Oppenheim. A lesion may readily cause a paralysis of only certain branches of the oculomotor nerve, even though it be a tumor at the base, and a partial palsy should not be sufficient reason for exclusion of a cause. Dr. Spiller also said that one must always remember that a recurrent oculomotor palsy may be the first sign of a general organic disease of the nervous system, like tabes or multiple sclerosis, but in the case reported no sign of such disease could be found.

DISCUSSION.—Dr. Zentmayer said that among other phenomena of ophthalmic migraine are the phosphenes and other sensory irritation symptoms, such as the so-called fortification spectra. Also the presence, in the blind area of the field, of visual hallucinations. He believed that Dr. Posey himself had once reported a case in which the patient saw a bull's-eye in the hemianopic blind field.

A rare field defect noted by Dr. Zentmayer in a man 45 years of age, who had been subject to migraine since childhood, was a temporary ring scotoma in both fields. Later the defect became hemianopsic in one eye, but retained its half-ring form. The patient died from pneumonia about a year subsequent to these observations.



### Epithelial Dystrophy of Cornea.

DR. WM. ZENTMAYER presented a case of Epithelial Dystrophy of the Cornea. The patient, who was seen at Wills Hospital, was a woman 65 years of age. Her vision had been slowly failing for about one year. There was no history of inflammation nor was she engaged in any occupation irritating to the eyes. Her general health was excellent. Vision, O. D. 15/30, O. S. 15/200.

In each cornea there is an ovoid area measuring 6 by 8 mm., in which the

corneal epithelium is cloudy and presents in places dart-like elevations, which catch the light in oblique illumination and look almost crystalline. The cloudiness is due to pin-point opacities. The small elevations are probably due to changes in Bowman's membrane. The cornea is not anesthetic. The fundus is normal. In the skin of the lids there are patches of xanthelasma. The Wassermann is negative. The von Pirquet is strongly positive.

HAROLD W. HOW, Secretary.

### SHORT ABSTRACTS.

**Marin.—Papilledema and Lumbar Puncture.**—(La Clinique Ophtalmologique, July, 1917.)

The majority of authors give the etiologic factors of choked disk in the following order of frequency: Tumors, syphilis, tuberculosis, hydrocephalus, hemorrhages, and abscesses. However the author has in his experience found tuberculous meningitis the most frequent cause, followed by hydrocephalus, tumors, etc.

He reports three cases in detail which show the beneficial results of many lumbar punctures in the tuberculous variety of meningitis, performing this operation fifteen times in one case. He feels that the favorable action is due not only to the elimination of the toxins (Leber's theory); but also to the increasing of the intracranial circulation which gives more nutrition, and is the principal defense against the infection.

Lumbar puncture is a much simpler procedure than trephining and callosal puncture, and if it proves insufficient the more radical procedures may then be instituted. The amount of fluid removed depends upon the age of the patient and the decrease in the swelling of the disk, the latter being the best guide. Generally 20-30 cc. will suffice in adults. The only medication used with benefit has been small but frequent doses of mercury which possess a tonic stimulating action in tubercu-

losis lesions especially when the visual apparatus has been attacked.

J. S. W.

**Cabaut, J. A.—Two Cases of Filaria Loa.**—(Boletín de la Sociedad de Ophtalmología de Buenos Aires, v. 4, p. 33.)

This paper gives a report of two cases, in the first of which the author was able to remove the parasite which was moving freely under the skin of the inferior lid by means of a threaded needle passed through the skin around the vermes and tied quickly, in order to capture it. A small incision on the skin allowed a forceps to catch and pull the parasite, which came out intact. It was six centimeters long by half millimeter wide. Under the microscope it proved to be a *Filaria Loa*.

Another parasite was removed some days afterward from under the conjunctiva of the same eye. As it moved very quickly, Cabaut was only able to catch it with a forceps through the conjunctiva. In making the incision the vermes was cut in two parts and only the caudal end extracted.

Examination of the blood of this patient during day time showed great quantities of embryos surrounded by a sheath. Marked eosinophilia.

In the second patient the parasite was also seen under the conjunctiva and the same method of extraction employed with partial success, due to the swiftness of the vermes.



Only six other cases are reported in the ophthalmologic literature of Argentina; all in patients that, as those of Cabaut, have lived in Congo, Sudan or other places in Africa, where it is very common.

U. T.

**Maxwell, Euphan M. and Kiep, Walter H.—Iritis and Cyclitis Occurring in Dysenteric Patients.**—(Brit. Jour. Ophth., Feb., 1918.) The writers observed six cases of iritis or cyclitis in patients infected with *B. dysenteriae*; all of these occurred in the Mediterranean region, and in four of them there was arthritis. The histories of these patients are given in full and there are added the following conclusions: (1)

Patients suffering from an infection by *B. dysenteriae* (Shiga) may occasionally develop anterior uveitis as a result of this infection, as pointed out by Morax. (2) This ocular affection may, or may not, be accompanied by articular manifestations. (3) The ocular affections would appear to occur most frequently about one month after the first signs of involvement of the bowel, but may occur as early as the twelfth day. (4) The articulo-ocular syndrome corresponds exactly to that occurring in another affection of a mucous tract, viz., gonorrhea, as pointed out by Garrod.

C. H. M.

# American Journal of Ophthalmology

Series 3, Vol. 1, No. 6.

June, 1918

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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## EYE LESIONS OF INFECTIVE JAUNDICE.

The scientific designation "Spirochetosis Ictero-hemorrhagica," proposed for this disease, is so long and cumbersome that in view of the uncertainty of the proper name to be applied to the causative organism we are still justified in using the older names of "Febrile or Infective Jaundice" or "Weil's Disease." It had long been encountered and referred to in medical literature as febrile, infective or epidemic jaundice, before Weil in 1886 described it as a distinct pathologic entity. Even after that it was classed with such varied conditions as typhus, typhoid fever, acute yellow atrophy of the liver, malaria, poisoning by putrid meat, yellow fever and amebic dysentery.

Altho supposed to be infectious its etiology was unknown, the guess of the cause most referred to being some form of proteus. Since Weil's description of it, sporadic cases and endemics of it have been reported from many parts of the world. Osler refers to an endemic in Egypt, fatal in ten per cent of the cases, but generally it is less

dangerous. It was recognized in various districts in Japan, and studied by a group of Japanese investigators with important scientific and practical results. In February, 1915, Inada and Ito announced that the cause is a spirochete. The proof of causation by this organism is now complete, it has been transmitted to lower animals especially guinea pigs and rats. The organism has been grown in pure culture, its injection has produced the disease in the guinea pig, and the guinea pig inoculated experimentally has accidentally transmitted the disease to man.

Whether the organism should be called a spirochete or whether it should be regarded as belonging to a distinct genus, for which Noguchi suggests the name *Lepidospira*, will have to be settled by especial students of microbiology. Examined alive, with dark ground illumination, it is seen to move very rapidly even thru semi-solid media. This power will account for its ability to invade the sound skin of the guinea pig, even in a few minutes.

Like the *spirocheta pallida*, it makes its way to all parts of the body; but unlike that organism provokes an ade-

quate protective reaction, which makes the disease self-limited. By the end of 30 to 40 days the invader has been expelled from the body, and the symptoms that arise later, are the after effects of the invasion that has passed. Apparently the rat is the carrier. Infected rats have been found in the mines of Japan, the trenches of Belgium and France, the cities and rural districts of Southern England, and among the mountains of Tennessee. So far no intermediary host has been found, and it is possible for the organism to live days outside the body.

As pointed out by Weekers and Firket (see January Journal, p. 50) the chief eye symptoms do not arise during the more acute febrile stage, except a general ocular hyperemia noticed especially in the conjunctiva in a large majority of cases. But the disease is liable to be unrecognized until jaundice sets in at about the fifth day. The jaundice, which is often slight and may be absent, is most noticeable over the sclera and has been noted on the optic disk. The evidence of more serious ocular lesions arises with the second febrile reaction about ten days to two weeks after the first general symptoms. Such lesions are likely to be subacute or chronic in form, but they tend to ultimate recovery, generally complete.

The general tendency to disorganization of the blood and hemorrhage is manifest in subconjunctival ecchymoses. Retinal hemorrhage should also be looked for. But the most common and serious ocular lesions are those involving the uveal tract. These are reported in from 10 to 15 per cent of all severe cases; and may bring the patient under the observation of the oculist after general convalescence has been fairly established. The pupils may dilate slowly and irregularly under atropin, and not at all to cocain; altho little other evidence of iritis is present. Few synechiae are formed, but slight opacities of the vitreous are common.

Neuro-retinitis, optic neuritis and retrobulbar neuritis occur in an important proportion of cases, and muscæ are much complained of. Following exper-

imental intraocular injections, Hertel observed corneal lesions in which he found the organisms, as well as in the conjunctiva, uveal tract, retina, and optic nerve. Before the discovery of the spirochete Koshichi had observed exudates and small hemorrhages in practically all parts of the eye, except the lens; with the changes most marked in the ciliary body and neighboring vitreous. Excessive lacrimation and photophobia have also been associated with trigeminal neuralgia in some cases.

Such studies as have already been made regarding this disease, beside revealing on the clinical side a new condition in which the ocular lesions are of practical importance, throw new light on the pathology of diseases due to invasion by this class of organisms.

E. J.

## THE AMERICAN OPHTHALMOLOGICAL SOCIETY.

This is an organization that should be better known to the ophthalmologists of America. It is the oldest association in America devoted to a special branch of medicine; and with probably one exception the oldest society of the kind in the world. It has a restricted membership, but ophthalmologists of good professional standing have always been welcome to attend its meetings; and many of them have availed themselves of this opportunity and have been invited to take part in its discussions.

Its Transactions should be familiar to all English reading ophthalmologists. They can be obtained of the Secretary, Dr. Sweet, for a subscription price less than that which they actually cost the members; for after they are once in type additional copies cost but little. Many of the most valuable papers on ophthalmic subjects that have appeared in the last fifty years have been published in these transactions. Upon them were largely founded the scientific reputations of Agnew, Noyes, Bull, Norris, Thomson, Harlan, Williams, Wadsworth, and Derby. Their successors are just as active and scientific, and continue a series of oph-



thalmic contributions of which any country might well be proud.

The meeting this year at New London, July 9 and 10, will be in a way an evidence of patriotism. Some of the most active and prominent members of the Society have entered the Government services; and it remains for others to close up the ranks and carry on its scientific campaign. It is a real service to sustain thru this time of war every valuable institution of our country in peace. This war is being fought for the future, and every valuable activity of peace that can be sustained unimpaired will add to the significance and value of victory. Every member of this society can do something to support the group of active workers in the Surgeon General's Office who have made the Ophthalmological division of the medical profession, the best organized body of professional men that have come to the support of the American Government in its struggle to keep the earth free for democracy and civilization.

### OUR JOURNAL FORM.

In an undertaking so largely mutual and cooperative as the publication of this journal, the reasons for its policy should be understood by all concerned. So much of the eye-work of the community is concerned with the printed page, that it is especially important that every oculist should do some definite thinking about the mechanical presentation of reading matter. These considerations justify devoting a little space to this subject.

In the first place the paper used should be permanent. Journal files become the largest and most important part of every medical library. Ophthalmology is relatively a new branch of medicine, at least in the development of a special literature, but already the files of its special journals are assuming great importance. It was worth while to use in our journal a paper made from good stock. Such paper is more expensive in America than anywhere else. The price on the amount needed for the printing of this journal

each month, has increased about forty dollars since the beginning of the year. Such an increase has caused the British Journal of Ophthalmology to decrease its size from 64 to 48 pages. Even this is not too great a sacrifice to make for good paper.

The surface of the paper used for such a journal has to be something of a compromise. The modern half-tone reproduction of photographs is most successful on a very smooth "highly-finished" surface. For the printing of text and diagrams a rougher surface serves better and does not give the regular reflection of light which is always annoying to the eyes. To get the very best result with half-tones we have to resort to the very smooth paper used for plates. But even for the body of the journal a paper rather highly finished has to be employed, since many half-tones need to be printed with the text.

The color chosen accords with the fact, established by scientific observation and general experience, that for black letters, white with a faint tint of color from near the center of the spectrum is the best back-ground. The cream tinted paper is better than that which approaches either blue or red. For the same reason the color of the cover has been selected. The black lettering appears more distinct against the yellow, than against a back-ground of any other decided color.

There are equally good reasons for using the double column page. At the ordinary reading distance a length of line of four inches or over requires too wide a lateral excursion of the eyes in reading it, for the greatest ease and comfort. This may be illustrated by reading the lines of the headings for the departments of News Items or of Ophthalmic Literature, and comparing these with the matter set in the same type but in double column beneath. The double column page gives the advantage of the shorter line with less blank paper; and yet affords the large page when needed for tables or illustrations.

There has been complaint as to the binding of the journal, and some reason for it. But the tendency of the

paper back to loosen and come off is connected with the way in which the sheets composing the journal are stitched. If this journal is opened its pages lie comparatively flat. Because they do so it is possible for the reader's eyes to avoid regular reflection from the smooth paper. Many journals of similar form never open flat; but show a roll of each page near where they join. Along such a roll there is always a band of regular reflection that the reader cannot escape. The form of stitching the sheets here used is more expensive, and the opening to lie flat puts a strain on the glue of the back that is never put on the back of

the journal stitched through with wire. But the difficulty with the back is being lessened; and the gain of avoiding a band of light reflex from the page is worth more than what is gained from the other form of stitching.

The form of this journal presents no novelty. It is the form which has gradually been evolved and adopted by modern literary journals of the highest class. There has been a reason for each step in this evolution; and these reasons should be known and appreciated by the ophthalmologist. The ocular hygiene of many patients requires attention to such details.

E. J.

## BOOK NOTICES.

**AMERICAN ENCYCLOPEDIA AND DICTIONARY OF OPHTHALMOLOGY**, Volume 12, edited by Casey A. Wood, assisted by a large staff of Collaborators. Pages 8905 to 9647. Cleveland Press, Chicago, 1918.

This book, we may suppose, is known to nearly all our readers. But this first notice of it in our new Journal may dwell a little on the general character of such a work. The encyclopedia in its modern development is best illustrated by the Eleventh edition of the Britannica. It is characterized by the bringing together matter related to every part of the subject with which it deals, and mention of all closely related knowledge; the division of its matter under a great number of topical headings and the arrangement of these topics alphabetically. It is a form of work almost unknown in medical literature. The bulk of so-called encyclopedias of medicine or surgery lack topical division and alphabetic arrangement. They are simply aggregations of lengthy monographs, expanded systematic text-books; or, if alphabetically arranged the topics are so briefly considered that they must be classed as dictionaries rather than encyclopedias. There is no work with which this one

can be compared. Its nearest predecessors are the Manuel d'Oculistique ou Dictionnaire Ophtalmologique, of M. Wenzel, 824 pages, 1800; and the uncompleted Encyclopedie der Augenheilkunde of O. Schwarz, 848 pages (1902-1909). The other books such as Norris and Oliver or the Graefe Saemisch that might be thought of in this connection are simply collections of monographs with no attempt at topical division or alphabetic arrangement; and cover a much narrower range of knowledge.

The alphabetic arrangement of topics is what gives the encyclopedia its value as a work of reference. The system or monograph does well enough for the systematic study of its subject; but it is quite inferior as a work of reference when the busy ophthalmologist has to look up a particular point regarding some case he has to deal with or some subject that is engaging his thought. This is not merely a theoretic distinction. In an office well supplied with modern ophthalmic literature, The American Encyclopedia of Ophthalmology, still incomplete, is more often consulted than all the "systems," etc., put together. This work when completed will be truly a working library in itself.



The present volume carries the work from Ophthalmology Literature of, page 8905, to Phonopticon Crystal, page 9647. The longer articles it includes are those on Orbit, by James Moores Ball; Orbit Injuries of, H. V. Wurdemann; and Orbit Operations on the, and Tumors of, apparently by the Editor, making 85 pages on the general subject of the orbit. Ophthalmoscope and Ophthalmoscopy, also by the Editor, take up 110 pages, and Perimetry, by Howard McI. Morton, 184 pages. But perhaps the information that it would be practically impossible to find in any other work, and which constitutes an extremely valuable contribution to the science of ophthalmology is that contained in the section on Parasites, ocular, 95 pages, by Henry B. Ward, Prof. of Zoology in the University of Illinois. For its valuable original articles, as well as for its systematic arrangement of the matter it presents, the early completion of this work is greatly to be desired. E. J.

**GLAUCOMA, A TEXTBOOK FOR THE STUDENT OF OPHTHALMOLOGY**, by Robert Henry Elliot, M. D., B. S., London, Sc. D. Edin. F. R. C. S., Eng. Lt. Col. I. M. S. (Retired). Pages 662. With 158 Illustrations. H. K. Lewis and Co., Ltd., 136 Gower St., London, W. C. 1918. Paul B. Hoeber, New York.

In these 532 pages of text, Col. Elliot has gathered the prevailing views as to that *symptom complex* called by us "glaucoma," has assorted them and eliminated, after due study of the vast literature, all of those which do not agree with his designation of the condition; which is a result of a number of lesions and which is best described in English as "elevation of the intraocular pressure." To this conception of the diseased condition has been fitted practically all forms of surgical intervention that have stood the test of time. In fact the only successful procedures have been those which resulted in a filtering scar.

The Author collates his subject under Anatomy and History, Intraocular Pressure and Tension, Etiology, Diagnosis Secondary and Congenital Glaucoma,

The Medical Treatment, Iridectomy and The Newer Operations including Sclerotomy, Lagrange and others up to Sclero-Corneal Trephining.

The Author's operation with the preliminary and after treatment is given the preference. Chapter X is given to the discussion of the filtering scar.

An appendix describes a New Scotometer and an Extension of Seidel's sign, which is a characteristic wing-like extension of the normal blind spot found in glaucoma.

Although this is the latest word on the subject of scleral-corneal trephining yet it will not be the last by any means. For tho most of us have accepted the procedure as the best form of operation, and in this category may be included the reviewer; yet there are those quoted in the book as doing this operation who have recently more or less given it up, going to the Lagrange operation or even back to iridectomy, on account of untoward results happening in their experience.

It may be permitted for the reviewer to remark that Lieut. Col. Elliot's personal experience of what must be now 2,000 operations without primary or secondary infections; and the results achieved by others who have followed the Author's technic of thick conjunctival flaps, indicate that this technic would have prevented these ills and would result in the practically universal acceptance of the procedure. H. V. W.

**THE STEREOSCOPE IN OPHTHALMOLOGY**. David W. Wells, Professor of Ophthalmology, Boston University Medical School. 12mo. 152 pages, 31 illustrations. Boston: Globe Optical Company. 1918.

The subtitle of this book states that it is, "with especial reference to the treatment of heterophoria and heterotropia, designed to accompany the Phoro-Optometer Stereoscope and the Wells Selection of Stereoscopic Charts." It illustrates the value of concentration of effort upon a limited subject in the production of a book that shall be of practical value. Few books that come to our notice are so well adapted to accomplish their object. The author indicates what he has



hoped to do by quoting from a reader of the first edition as follows: "I have been able to master your system of muscle training to the point of having gotten some very good results, with no other instructor than the book itself."

The use of the stereoscope in the treatment of heterophoria and heterotropia is alluded to in every treatise on these conditions, but it is a therapeutic measure that has been more alluded to than understood or practised. It is to be hoped that with clear, concise instructions as to methods of procedure this will be changed in the future; and this important method becomes truly available among the resources of most of those engaged in ophthalmic practice. If fusion training were more generally and more intelligently resorted to by ophthalmologists, its value would be recognized by the laity; and cases of muscular imbalance would come to treatment earlier as it became better understood that the treatment of squint was not wholly by glasses and operation.

This work, however, is somewhat broader than its title might imply. One chapter, one-tenth of the book, is devoted to "Musculo-Capsular Advancement—the Author's Modification of Worth Technic." It is a chapter that can be read with interest and profit even by the surgeon whose interest in squint has been merely operative. When read in connection with its context, a broader view even of mere operative technic becomes unavoidable.

The large clear type and general excellence of execution as well as its direct clear sentences make this a book that will be read with comfort as well as profit. E. J.

**TESTS FOR COLOR BLINDNESS.** By Prof. Dr. Shinobu Ishihara, Major I. J. A. M. C., Tokyo, Handaya, Hongo Harukicho, 1917. (Second Notice.)

This series of sixteen plates is intended to quickly and accurately discover congenital color blindness and is in use for testing railway employees, candidates for the navy and others. The illustrations are in the form of 9 cm., cir-

cular areas, made up of a collection of still smaller dots varying in size from 1 to 5 mm. The latter are formed of various pinkish, purplish, bluish and greenish confusion of colors. The objects to be discerned are numerals about 5 cm. in height, composed of confusion colors in this background of dots and of lines which may be traced from their beginning by the examinee, the latter being used for the illiterate.

The reviewer has had some use of the charts and has really been amused by the results of the examination in the color blind. The use of the Snellen red and green glasses for malingerers gives this new book or rather "test cards" a most prominent place, for certainly this supplements the Snellen Test in a most effective manner.

We especially call the attention of the Army and Navy Examiners to this series of Charts. H. V. W.

**INTERNATIONAL CLINICS.** Series twenty-eight. Vol. 1. Edited by H. R. M. Landis, M. D. Philadelphia. 8vo. 308 pages. Illustrated. Philadelphia and London. J. B. Lippincott Company. 1918.

The ophthalmologist devoting himself to special practice needs to keep in touch with the most important advancements in general medicine. A practical way of doing this is through this series of quarterly volumes of illustrated clinical lectures and original articles, edited with the collaboration of such eminent men as Sir Wm. Osler, Frank Billings, Charles H. Mayo, Rupert Blue, and their colleagues.

In this volume the departments represented in addition to the clinics are Medicine, Neurology, Public Health, and Surgery. There is also given the General Review of Medicine for the year 1917. Of especial interest to the Ophthalmologist are the lectures on "Injuries to Cranium and Brain in Warfare," by Charles Greene Cumston; "The Secondary Suture of Infected Wounds," by Dr. W. Estell Lee; and the "Treatment of Shell and Gunshot Wounds," by Henri Bigo.

The "Treatment of Non-Pulmonary

Tuberculosis," by Dr. John B. Hawes, and the "Therapeutic Use of Occupation" will be of some interest; and in the general review of medicine for 1917 is found brief reference to the important literature of "Infective Jaundice," a condition that we now know to be of ophthalmologic importance. E. J.

Luckiesh in the development of the daylight unit.

LUTHER C. PETER.

Philadelphia, Pa.

### Technic of Credé Method.

*To the Editor:* May I suggest that the controversy between Drs. Allport and Shastid over the Ophthalmia Neonatorum Law gives undue prominence to the remedies and not enough to the technic of application? Credé showed many years ago, in an extended tabulation, (see old files of this journal), that the *contact drop* from the glass *rod* was safe and the medicine dropper unsafe; but it is more than doubtful that this is known to the average accoucheur. Such may be listening (or reading), and he should not be led astray by a discussion on remedies. For many years I have preached the Credé gospel to my colleagues and the nurses in the training school, with emphasis on the technic and a demonstration of it. The law should not name the remedy without proper directions for its application.

H. B. YOUNG.

Burlington, Iowa.

## CORRESPONDENCE.

### Daylight Screens.

*To the Editor:* In my article on "Artificial Daylight Illumination," which appeared in the March number of the AMERICAN JOURNAL OF OPHTHALMOLOGY, the statement was made inadvertently, that "all daylight screens are manufactured by the Corning Glass works." In this I was misinformed, as I find that other firms and notably the National Lamp Works of Nela Park, Cleveland, have daylight units on the market. The medical profession gives a cordial welcome to any device which will aid in the conservation of vision, and the writer is deeply indebted to the Nela Research Laboratory for calling his attention to their screen, and to the work of Dr. M.

## NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. As these columns go to press on the 30th of the month contributors should send in their items by the 25th. The following gentlemen have consented to supply the News Item Editor with the news from their respective sections: Dr. H. A. Beaudoux, St. Paul; Dr. James A. Black, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. A. E. Davis, New York City; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. George F. Keiper, La Fayette, Indiana; Dr. George H. Kress, Los Angeles; Dr. W. Holbrook Lowell, Boston; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. George M. Waldeck, Detroit; Dr. Oscar Wilkinson, Washington. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered as well as all foreign countries. Volunteers are therefore needed and it is hoped that they will respond promptly to this call.

### DEATHS.

Dr. C. von Sicherer, University of Munich, died recently.

Dr. John Chase, aged 62, of Denver, died May 3rd, 1918, after a protracted illness.

Dr. I. S. L. Bermann, of Washington, D. C., died April 6th, from angina pectoris.

Lieut. Hugh Tate Moore, M. R. C., U. S. Army, Wilmington, N. C., aged 31, died at Camp Kearney, San Diego, California, April 8th from mercuric chlorid poisoning, the drug being taken by mistake for calomel.

### CORRECTIONS.

In the "Honor List" published in the May issue were included only the names of those in active service in the Army. Those connected with other branches of the service, as the Navy, were not mentioned. Although compiled from official sources it included only those on active duty at a certain date. The names of the following ophthalmologists and probably others were omitted:

Capt. George W. Woodnick, Chicago.

Adj. Sidney Walker, Jr., Chicago.

Lieut. C. P. Small, Chicago.



Capt. Herbert Walker, Chicago.  
 Capt. C. A. Bahn, New Orleans.  
 Major Burton Chance, Philadelphia.  
 Capt. Louis Levy, Memphis, Tenn.  
 Capt. John R. Newcomb, Indianapolis, Ind.  
 Capt. Maurice Krebs, Huntington, Ind.  
 Capt. Edward Willis, Indianapolis, Ind.  
 Capt. M. M. Clapper, LaFayette, Ind.

## PERSONALS.

Dr. John A. Donovan, of Butte, Montana, who has been ill with pneumonia, is now convalescent.

Dr. Austin A. Hayden, of Chicago, has been for some time confined to St. Joseph's Hospital, suffering from inflammatory rheumatism.

Dr. Nelson M. Black, and Dr. Vernon Chapman, announce their permanent association under the firm name of Drs. Black and Chapman, Suite 1213 Wells Building, Milwaukee, Wisconsin.

Dr. Joseph B. Cowherd has resigned as physician in charge of the eye, ear, nose and throat work of the Kansas City school hygiene staff, and has been succeeded by Dr. Thos. T. Sawyer.

Dr. Willis O. Nance, of Chicago, has been re-elected for his fifth term as a member of the city council. He is the only physician in the council, and has done most efficient work as chairman of the committee on public health.

Dr. C. R. Dufour, of Washington, D. C., has resigned as Clinical Professor of Ophthalmology and Otology at the Georgetown University Medical School and Hospital, and has been made Emeritus Professor of those specialties.

## COMING MEETINGS.

American Ophthalmological Society, Eastern Point, New London, Conn., July 9-10.

Oxford Ophthalmological Congress, Oxford, England, July 10-12.

American Academy of Ophthalmology, and Oto-Laryngology, with the Fourth Colorado Ophthalmological Congress, Denver, Colorado, August 5, 6, 7.

Pacific Coast Oto-Ophthalmological Society, Salt Lake City, August 12-13.

## SOCIETIES.

Dr. Richmond McKinney was elected President of the Tennessee Medical Association at its recent meeting at Memphis. Dr. McKinney was Chairman of the eye, ear, nose and throat section at this meeting.

There were about forty specialists present at the recent State meeting in Memphis. Very interesting clinics were given at the Memphis General Hospital. Dr. Fagin had charge of the eye clinic, which consisted of fifteen operative cases and many interesting external and fundus cases. Dr. McKinney had charge of the ear, nose and throat clinics.

At the annual meeting of the State Medical Society held in Springfield, Ill., on May 21-23, the Ophthalmological Section was unusually

well represented. The following Chicago ophthalmologists presented papers: W. O. Nance, J. C. Beck, R. J. Tivnen, F. Allport, G. W. Boot, C. P. Small, T. Faith, H. R. Boettcher, J. R. Hoffman, H. L. Pollock, E. F. Garraghan, H. H. Roth, M. Goldenburg, and E. R. Crossley. Dr. Wesley H. Peck was elected President of the Section for the ensuing year.

## MILITARY NOTES.

Capt. Wm. A. Sedwick, of Denver, stationed at Camp Grant, has been spending a ten-day furlough at home.

Dr. I. A. Lederman is a member of the Medical Advisory Board, District Number 11, in charge of the eye and ear department, in Louisville.

Capt. John R. Newcomb, M. R. C. of Indianapolis, Ind., has left for Washington, and has been assigned for temporary duty with the attending surgeon's office in Washington.

Dr. Edgar M. Marbourg of Colorado Springs, Colo., recently received a commission as captain in the M. R. C., and has been ordered to report for duty at Camp Pike, Ark.

Dr. M. L. Foster, of New Rochelle, N. Y., and of the editorial staff of the New York Medical Journal, has been called to Ft. McHenry, Md., and assigned to active duty in the Army General Hospital.

Major H. B. Hitz, M. R. C., Oto-Laryngologist to the Milwaukee Base Hospital Unit, left May 19th. This unit is a well equipped one-thousand bed hospital and has been mobilized and under intensive training for several months at Milwaukee.

Dr. Charles D. Blassingame, of Memphis, Tenn., who has been with the firm of Drs. Hill, Simpson and Fagin, now has charge of eye work at the Government Hospital at Fort Screvens. He has recently been made captain.

Drs. George E. de Schweinitz, of Philadelphia; Casey A. Wood, of Chicago, and Nelson M. Balck, of Milwaukee, working in the office of the Surgeon-General, have been promoted to the rank of Lieut.-Colonel in the National Army.

Lieut. John J. Shea and Lieut. J. B. Stanford, of Memphis, Tenn., who were connected with the Aviation School at Memphis, are now at Ft. Oglethorpe. They have been assigned to Major Frank D. Smythe's Hospital Unit, and expect to sail for France soon.

Lieut. Wm. Brown Doherty, M. R. C., formerly an interne in the N. Y. Eye and Ear Infirmary, and more recently associated with Dr. J. M. Ray in Louisville, Ky., went to France in January attached to Hospital Train No. 20, and is now connected with a base hospital in Paris.

Of the following Boston ophthalmologists, Major Allen Greenwood is on government duty in France; Major Alexander Quackenboss is on duty at the base hospital at Camp Wheeler, Macon, Georgia; Capt. A. Gardiner Morse is on duty at the Base Hospital at Camp



Grant, Rockford, Illinois; and Capt. John G. Jennings is on duty at Ellington Field, Houston, Texas.

Dr. Walter R. Parker, of Detroit, who for the past year has been on duty in the Surgeon-General's office in Washington, has been promoted to the rank of Colonel. Dr. Parker entered the army service a year ago in the Medical Reserve Corps and was later made a lieutenant-colonel in the National Army.

Of the Detroit oculists, Capt. George Frothingham, who has been in charge of the Aviation examinations in Detroit for the past year, has been transferred to Mineola, L. I. Capt. Robert Beattie has been called into active service, and is now stationed at Ft. Sherman, Chillicothe, Ohio. Capt. Byron H. Jenny has been stationed at Camp Bowie, Ft. Worth, Texas. First Lieut. Frank C. Ryerson is now stationed at Selfridge Field, Mt. Clemens, Mich. First Lieut. Raymond S. Goux has been assigned to Hazelhurst Field, L. I.

Major Charles Franklin Adams, M. R. C., is chief of the Eye, Ear and Nose Section in the Base Hospital at Camp Greene, Charlotte, N. C.

#### MISCELLANEOUS.

A special course of training in ophthalmic treatment and nursing will be given at the New York Ophthalmic Hospital to fit students for war service.

The National Committee for the Prevention of Blindness is raising a special fund of \$20,000 to provide shelter and treatment for those blinded in the Halifax disaster.

It is pertinent at this time to warn all those in military service against the wearing of spectacle frames and eye-glass frames made of any inflammable material. It might be disastrous in the presence of fire, explosions, etc., to which active service may expose the wearer.

The University of Guatemala was founded April 30th, 1918, and is named the "Estrada Cabrera" and is modeled after the best universities of the United States. The Medical School will be one of its parts. Dr. Pacheco Luna will be at the head of the Department of Ophthalmology.

The National Committee for the Prevention of Blindness has issued its report for the year 1917. In the thirty-one state schools for the blind in the U. S., 8,961 pupils were blind from ophthalmia neonatorum. In addition there were 375 in the public schools. A total, therefore, of 9,336 pupils blind from this disease. The Committee estimates that there are 15,000 people in the U. S. today who are blind from industrial accidents.

At a meeting of twenty-four optical manufacturers, held in New York City, May 15th, it was resolved to organize a War Service Committee to represent the entire optical industry. This committee will assemble accurate information with respect to the facilities of the industry, act with the War Industries Board to establish principles governing the distribution of materials in transportation, and advise the departments of the Government with regard to questions affecting the industry.

# OPHTHALMIC LITERATURE.

Under this head continuing the "Index of Ophthalmology" heretofore published in **Ophthalmic Literature** will be found the subjects of all published papers received during the last month, that bear to an important extent upon ophthalmology. The subject is indicated rather than the exact title given by the author. Where the original title has been in a foreign language it is translated into English. The journal in which the paper is published will indicate the language of the original.

The names of the different journals are indicated by abbreviations which generally correspond to those used by the **Index Medicus**, the **Journal of the American Medical Association**, and the **British Journal of Ophthalmology**. We will from time to time publish the list of ophthalmic journals, with the abbreviations used for each. Often a single letter discriminates between journals published in different languages. Thus "Arch. of Ophth." refers to the Archives of Ophthalmology, published in English; "Arch. d'Opht.," indicates the French Archives d'Ophtalmologie; "Arch. de Oftal." refers to the Archivos de Oftalmologia Hispano-Americanos, while "Arch. di Ottal." indicates the Italian Archivio di Ottalmologia.

In this index of the literature the different subjects are grouped under appropriate heads; so that all papers bearing on the same, or closely related subjects, will be found in one group. The succession of the groups is the same from month to month, and identical with that of the Digest of the Literature. Where a paper clearly refers to two subjects that belong in different groups, it will be noticed in both groups.

Each reference begins with the name of the author in heavyface type. This is followed by the subject of his paper. Then in brackets a number with (ill.) indicates the number of illustrations, or a number with (pl.) the number of plates illustrating the article, (col. pl.) indicates colored plates. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that the paper was read before some society and gave rise to a discussion which is published with it.

The "repeated titles" may render accessible the essential part of a paper, the original of which could not be consulted. These give (in brackets) after the author's name the volume and page of this department of "Ophthalmic Literature" where the title of the paper will be found; and then the journal, volume, and page where the translation or abstract is published.

It is desired to notice every paper as soon as possible after it is published. Readers will confer a favor by sending titles they notice have been omitted, with journal and page of publication; and of their own papers, sending either a copy of the journal in which each appeared, or a reprint. These should be sent as soon as possible to 318 Majestic Building, Denver, Colorado.

## DIAGNOSIS.

- Alexander, G. F.** Recording Visual Acuity. (1 ill.) Brit. Jour. Ophth., v. 2, p. 277.
- Clapp, C. A.** Tuberculin in Diagnosis of Eye Lesions. Arch. of Diag., v. 10, p. 399.
- Crisp, W. H.** Malingering. (Dis.) Colo. Ophth. Soc., Jan., 1918. Amer. Jour. Ophth., v. 1, p. 344.
- Dunn, P.** Detection of Simulated Blindness. Med. Press., v. 105, p. 317.
- Heydt, R. von der.** Corneal Loupe. (1 ill.) Amer. Jour. Ophth., v. 1, p. 339.
- Terrien.** Detection of False Diplopia. Arch. d'Opht., v. 36, p. 45.
- Woll, F. A.** Visual Acuity of Cadets at Peekskill, N. Y. Amer. Jour. Pub. Health, April, 1918, p. 304.

## THERAPEUTICS.

- Andersen, C. L.** Protein Therapy in Eye Diseases. Hospitalstidende, Feb. 20, 1918, p. 244. Abst. Jour. Amer. Med. Assn., v. 70, p. 1344.
- Terson, A.** External Use of Salicylarsenate of Mercury as an Ocular Remedy. Arch. d'Opht., v. 36, p. 8.

## REFRACTION.

- Bates, W. H.** Study of Images Reflected from Cornea, Iris, Lens, and Sclera. (8 ill.) New York Med. Jour., May 18, 1918, p. 916.
- Blegvad, O.** Progressive Course of Myopia. Ugeskrift for Laeger. Feb., 1918, p. 287. Abst. Jour. Amer. Med. Assn., v. 70, p. 1344.
- Champlin, H. W.** Reasons Why We Wear Glasses. Med. Council, v. 23, p. 381.
- Cobbledick, A. S.** Eyestrain. Lancet, April 27, 1918, p. 604.
- Ferree, C. E., and Rand, G.** Radiometric Apparatus for Use in Psychologic and Physiologic Optics. Psychologic Rev. Co., Princeton, N. J., 81 pp., 8vo., 1917.
- Hering, C.** Contribution to Physiologic Optics. Science, May 3, 1918, p. 438.
- Landolt, E.** Influence of Age on Refraction of Eye. (1 chart.) Arch. d'Opht., v. 36, p. 1.
- McCabe, F. J.** Eyestrain and General Practice. Rhode Island Med. Jour., May 19, 1918, p. 71.

**Mann, R. H. T.** Use and Abuse of Glasses. *Western Med. Rev.*, v. 23, p. 245.

**Thompson, A. H.** Eye Strain. *Lancet*, April 6, 1918, p. 515.

#### OCULAR MOVEMENTS.

Etiology of Congenital Ophthalmoplegia. *New York Med. Jour.*, v. 107, p. 992.

**Gowland, A.** Voluntary Nystagmus. *Bol. de la Soc. de Oftal. de Buenos Aires*, v. 4, p. 117. *Abst. Amer. Jour. Ophth.*, v. 1, p. 369.

**Posey, W. C.** Recurrent Oculomotor Palsy. *Wills Hosp. Ophth. Soc.*, April 2, 1918. *Penn. Med. Jour.*, v. 21, p. 542.

**Struycken, H. J. S.** Recording Nystagmus. *Nederl. Tijdschr.*, v. Geneesk, 1918, p. 621. *Jour. Amer. Med. Assn.*, v. 70, p. 1510.

**Terrien, F.** Muscular Advancement with Suture. (2 ill.) *Arch. d'Ophth.*, v. 36, p. 13.

**Viets, H.** Unilateral Ophthalmoplegia. (4 ill.) *Jour. Nerv. and Ment. Dis.*, v. 47, p. 249.

**Wiener, A.** Bilateral Total Ophthalmoplegia. *Med. Rec.*, v. 93, p. 724. *Arch. of Ophth.*, v. 47, p. 307.

#### CONJUNCTIVA.

**Green, A. S., and L. D.** Dakin's Dichloramin-T Solution for Ocular Infections. *Jour. Amer. Med. Assn.*, v. 70, p. 1212.

**Königstein, L.** Trachoma. *Wiener med. Woch.*, March 16, 1918. *Med. Rec.*, May, 25, p. 913.

**Loeb, C.** Prenatal Infection of Conjunctiva. *Ill. Med. Jour.*, May, 1918, p. 257.

#### CORNEA AND SCLERA.

**Bolten, G. C.** Blue Sclerotics. *Nederl. Tijdschr. v. Geneesk*, 1918, i, p. 560. *Jour. Amer. Med. Assn.*, v. 70, p. 1344.

**Boyd, E. T.** Corneal Abscess. *Colo. Ophth. Soc.*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 340.

Uveitis with Punctate Keratitis. (Dis.) *Colo. Ophth. Soc.*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 340.

**Harvie, J. B.** Blue Sclerotics and Brittle Bones. *Albany Med. Ann.*, v. 39, p. 169.

**Posey, W. C.** Corneal Opacity. (Dis.) *Wills Hosp. Ophth. Soc.*, Feb., 1918. *Amer. Jour. Ophth.*, v. 1, p. 359.

**Stilwill, H. R.** Scleritis. (Dis.) *Colo. Ophth. Soc.*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 341.

**Weaver, T. W.** Methylene Blue for Staining Cornea. *Amer. Jour. Ophth.*, v. 1, p. 379.

**Zentmayer, W.** Epithelial Dystrophy of Cornea. *Wills Hosp. Ophth. Soc.*, April, 1918. *Penn. Med. Jour.*, v. 21, p. 543.

#### ANTERIOR CHAMBER AND PUPIL.

**Fry, F. R.** Graphic Representation of Pupils. *Jour. Nerv. and Ment. Dis.*, March, 1918, p. 205.

**Lutz, A.** Light Pupillary Reflex with Unilateral Argyll-Robertson Pupil, Consensual Reaction in Both Eyes. (8 ill.) *Arch. of Ophth.*, v. 47, p. 266.

#### UVEAL TRACT.

**Allport, F., and Smith, J. R.** Atrophy of Iris. (2 ill.) *Amer. Jour. Ophth.*, v. 1, p. 326.

**Black, M.** Tuberculosis of Uvea. (Dis.) *Colo. Ophth. Soc.*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 341.

**Boyd, E. T.** Iritis with Synechia. *Colo. Ophth. Soc.*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 340.

**Collette, H.** Uveitis with Meningococcic Infection. *Arch. de Méd. d. Enf.*, Paris, v. 20, p. 194.

**Dwyer, J. G.** Focal Infection of Eye from Intestinal Tract. (Dis.) *Arch. of Ophth.*, v. 47, p. 261, 305.

**Fahmy, Abdel H.** Septic Mouth a Cause of Iritis. *Abst. Brit. Jour. Ophth.*, v. 2, p. 292.

**Loeb, C.** Iritis from Diseased Teeth. *Ill. Med. Jour.*, May, 1918, p. 258.

**Spencer, F. R.** Iritis Due to Tooth Abscess. (Dis.) *Colo. Ophth. Soc.*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 343.

**Weve, H.** Iridocyclitis with Mumps. *Nederl. Tijdschr. v. Geneesk*, 1918, i, p. 544. *Jour. Amer. Med. Assn.*, v. 70, p. 1343.

#### GLAUCOMA.

**Knapp, A.** Return of Tension and Retrochoroidal Hemorrhage After Trephining. *Arch. of Ophth.*, v. 47, pp. 256, 308.

**Smith, P.** Blood Pressure in Eye; Its Relation to Chamber Pressure. (12 ill. Bibl.) *Brit. Jour. Ophth.*, v. 2, p. 257.

Repeated Titles. **Magitot** (v. 1, p. 158.) *Amer. Jour. Med. Sc.*, v. 155, p. 769.

#### CRYSTALLINE LENS.

**Allport, F.** Smith-Indian Intracapsular Operation for Cataract. (Dis.) *Chicago Ophth. Soc.*, Feb., 1918. *Amer. Jour. Ophth.*, v. 1, p. 345. *New York Med. Jour.*, May 18, 1918, p. 924.

**Boyd, E. T.** Unusual Cataract. (Dis.) *Colo. Ophth. Soc.*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 339.

**Giri, D. V.** Secondary Pupil. *Brit. Jour. Ophth.*, v. 2, p. 275.

**Hepburn, M. L.** Extraction of Cataract. *Brit. Jour. Ophth.*, v. 2, p. 300.

**Koyanagi, Y.** Blue Cataract. (1 ill. Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 360.

**Loeb, C.** Dislocation of Lenses into Vitreous. *Ill. Med. Jour.*, May, 1918, p. 260. Complicated Cataract with Change in Refraction. (Corneal Astigmatia.) *Ill. Med. Jour.*, May, 1918, p. 258.

**Santos Fernandez, J.** Extraction of Congenital and Traumatic Cataracts. *Cron. Med. Quir. de la Habana*, March, 1918.

**Schwenk, P. N. K.** Infection after Cataract Operations. (Dis.) *Wills Hosp. Ophth. Soc.*, Feb., 1918. *Amer. Jour. Ophth.*, v. 1, p. 358.

Repeated Titles. **Barraquer and Anduyned.** (v. 1, p. 78.) *Amer. Jour. Ophth.*, v. 1, p. 370.



## RETINA.

- Abney, W. de W.** Congenital Night Blindness. *Proc. Roy. Soc., London*, 1917, v. 94, p. 59.
- Bardsley, P. C.** "Gunn's Dots." *Brit. Jour. Ophth.*, v. 2, p. 299.
- Bayliss, W. M.** Physiology of Retina (Effect of Glare on Eye). *Illuminating. Eng. Soc.*, April 16. *Abst. Brit. Med. Jour.*, April 20, 1918, p. 460.
- Haden, H. C.** Star-shaped Figure in Macula of Syphilitic Origin. (3 ill.) *Amer. Jour. Ophth.*, v. 1, p. 313.
- Jackson, E.** Blood Pressure and Intraocular Pressure. *Amer. Jour. Ophth.*, v. 1, p. 373.
- Eclipse Blinding. *Amer. Jour. Ophth.*, v. 1, p. 371.
- Ormond, A. W.** Fundus Oculi During Temporary Blindness. *Brit. Jour. Ophth.*, v. 2, p. 273.
- Taylor, S. J.** "Gunn's Dots." *Brit. Jour. Ophth.*, v. 2, p. 300.
- Thompson, H. M.** Circumscribed Tuberculous Retinochoroiditis. *Colo. Ophth. Soc.*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 344.
- Weeks, J. E.** Bilateral Congenital Coloboma of Macular Region. *Arch. of Ophth.*, v. 47, p. 307.
- Winkler, C.** Amaurotic Idiocy. *Nederl. Tijdschr. v. Geneesk.*, 1917, p. 663. *Abst. Arch. d'Opht.*, v. 36, p. 59.

## OPTIC NERVE.

- Fernandez, F. M.** Optic Nerve Atrophy. *España Oftal.* Jan., 1918, p. 29.
- McKendree, C. A.** Epilepsy with Post-neuritic Optic Atrophy. *Neurol. Bull.*, Feb. 1918, p. 49.
- Marin.** Papilledema and Lumbar Puncture. *Clin. Opht.*, July, 1917.

## VISUAL TRACTS AND CENTERS.

- Allen, F. J.** An Optical Phenomenon. *Nature*, London, 1917, p. 324.
- Bramwell, B.** "Crossed" Aphasia. (Mirror Writing). *Edinb. Med. Jour.*, v. 20, p. 220.
- Buckley, W.** Ocular Complications in Gunshot Wound of Head. *Lancet*, April 13, 1918, p. 537.
- Cave, C. J. P.** An Optical Phenomenon. *Nature*, London, 1917, p. 284.
- Fridenberg, P.** Visual Factors in Equilibration and Vertigo. *Int. Jour. Surgery*, v. 31, p. 115.
- Goudge, M. E.** Qualified and Quantitative Study of Weber's Syndrome. *Amer. Jour. Psychol.*, 1918, v. 29, p. 81.
- Posey, W. C.** Permanent Quadrant and Hemianopic Lesions with Migrain. *Wills Hosp. Ophth. Soc.*, April 2, 1918. *Penn. Med. Jour.*, v. 21, p. 541.
- Souques and Odier.** Localization of Cortical Macula in Hemianopsia. *Rev. Neurol.* 1917, p. 45. *Abst. Arch. d'Opht.*, v. 36, p. 62.

- Velter, E.** Ocular Troubles with Cranial Injuries. (10 pl.) *Arch. d'Opht.*, v. 36, p. 17.
- Zeemann, W. P. C.** Binocular Perception of Brightness. *Nederl. Tijdschr. v. Geneesk.*, 1917, p. 265. *Amer. Jour. Ophth.*, v. 1, p. 368.

## COLOR VISION.

- Malling, B.** The Color Sense. (1 ill.) *Amer. Jour. Ophth.*, v. 1, p. 362.
- Schiötz, I.** Color Perception and Color Blindness in Man and Animals. *Med. Rev.*, Bergen, 1917, p. 425.
- Wernicke, O.** Total Achromatopsia. *Amer. Jour. Ophth.*, v. 1, p. 365.

## EYEBALL.

- Greenspon, E. A.** Pathologic Bacillus Subtilis Isolated from Eye. *Amer. Jour. Ophth.*, v. 1, p. 316.
- Roche, C.** Reconstruction and Prothesis. (1 ill.) *Arch. d'Opht.*, v. 36, p. 41.

## LACRIMAL APPARATUS.

- Crisp, W. H.** Abscess of Caruncle. *Colo. Ophth. Soc.*, Jan., 1918. *Amer. Jour. of Ophth.*, v. 1, p. 344.
- Gleason, E. B.** Obstructive Lacrimonasal Disease and Its Treatment. (Dis.) *Sec. on Ophth. Coll. Phys.*, Phila., Dec. 7, 1917. *Amer. Jour. Ophth.*, v. 1, p. 354.
- Rocha, N. da.** Massage of Lacrimal Sac. *Brazil Med. v. 32*, p. 26. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 1269.

## LIDS.

- Heller, I. M.** Xanthelasma Treated by Fulguration. *Arch. of Ophth.*, v. 47, p. 305.
- Lloyd, H. D.** Primary Syphilis of Eyelid. (1 ill.) *Boston Med. and Surg. Jour.*, May 2, 1918, p. 609.
- Loeb, C.** Hysterical Paralysis of Levator. *Ill. Med. Jour.*, May, 1918, p. 261.
- Poyet, G., and Lallemand, M.** Eyelid Reflex from Auditory Stimulus. *Arch. de Méd. et de Pharm. Militaires*, Paris, v. 68, p. 754.
- Thompson, H. M.** Blepharospasm Secondary to Pyorrhea Alveolaris. *Amer. Jour. Ophth.*, v. 1, p. 338.

## ORBIT.

- Bedell, A. J.** Traumatic Pulsating Exophthalmos. *Amer. Jour. Ophth.*, v. 1, p. 311.
- Pardo, R.** Posterior Enucleo-exenteration of Eyeball. *Gazz. degli Osp. e delle Clin.*, v. 39, 1918, p. 125.
- Zarzycki, P.** Ocular Prothesis. *Abst. Arch. d'Opht.*, v. 36, p. 63.

## TUMORS.

- Boot, G. W.** Angioma of Orbit. (Dis.) *Chicago Ophth. Soc.*, Feb. 18, 1918. *Amer. Jour. Ophth.*, v. 1, p. 350.
- Coover, D. H.** Fibroma of Orbit. *Colo. Ophth. Soc.*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 341.
- Gifford, S.** Leucosarcoma of Iris Treated by Radium. (2 ill.) *Arch. of Ophth.*, v. 47, p. 241.

- Posey, W. C.** Adenoma of Orbit. (Dis.) Wills Hosp. Ophth. Soc., Feb. 1918. *Amer. Jour. Ophth.*, v. 1, p. 360.

### INJURIES.

- Allport, F.** Removal of Steel from Interior of Eye by Magnet. *Med. Rev. of Rev.*, v. 24, p. 298.
- Black, N. M.** Eye in Industrial Accidents. *Wisconsin Med. Jour.*, v. 16, p. 435.
- Champlin, H. W.** Foreign Bodies in Eye. *Jour. Amer. Inst. Homeop.*, v. 10, p. 1405.
- Denig, R.** Transplantation of Mucous Membrane of Mouth for Burns of Cornea. (150 Cases.) *Arch. of Ophth.*, v. 47, p. 309.
- Gibson, J. L.** Use of Giant Magnet. *Med. Jour. Australia*, 1917, ii, p. 533.
- La Motte, W. O.** Recognition and Treatment of Common Injuries and Diseases of Eye. *Delaware State Med. Jour.*, v. 9, p. 17.
- Posey, W. C.** Perforating Wound of Globe. Wills Hosp. Ophth. Soc., Feb., 1918. *Amer. Jour. Ophth.*, v. 1, p. 359.
- Roy, D.** Removal of Foreign Bodies from Eyeball and Orbit. (Dis.) *South. Med. Jour.*, v. 11, p. 386.
- Spencer, F. R.** Steel in Orbit. (Dis.) *Colo. Ophth. Soc.*, Jan., 1918. *Amer. Jour. Ophth.*, v. 1, p. 343.
- Wright, C. D.** Traumatic Anomalies of Lens. *Minn. Med.*, v. 1, p. 135.
- McCaw, H. J., Perdrau, J. R., and Stebbing, G. F.** Toxic Bulbar Paralysis (Botulism). *Lancet*, April 27, 1918, p. 616.
- McFarling, A. C.** Relation of Eyestrain and Epilepsy. *Southwest Jour. Med. and Surg.*, v. 26, p. 73.
- Morrison, F. A.** Hysteric Amblyopia. *Amer. Jour. Ophth.*, v. 1, p. 338.
- Pritchard, E.** Amaurosis Following Violent Convulsions in Children. *Proc. Roy. Soc. Med. Sec. on Dis. Child.*, Dec. 1917. *Brit. Jour. Ophth.*, v. 2, p. 294.
- Ring, G. O.** Association of Ocular and Nasal Accessory Sinuses Disease. (Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 324.
- Smith, S. M.** Intracranial Complications of Aural Diseases in Relation to Ophthalmology. (Dis.) *Sec. on Ophth.*, *Coll. Phys.*, Phila., with *Sec. on Oto-Laryngol.*, Dec., 1917. *Amer. Jour. Ophth.*, v. 1, p. 352.
- Teulières, M.** Injury of Eyes in the Gassed. *Jour. Méd. de Bordeaux*, v. 89, p. 37. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 1265.
- Yudkin, A. M.** Leprosy with Reference to Ophthalmologic Findings. (1 ill. Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 303.
- Zentmayer, W.** Ocular Lesions the Result of Oral and Pharyngeal Diseases. (Dis.) *Sec. on Ophth.*, *Coll. Phys.*, Phila., with *Sec. on Oto-Laryngol.*, Dec., 1917. *Amer. Jour. Ophth.*, v. 1, p. 354.
- Ziegler, S. L.** Ocular Signs and Symptoms Associated with Intranasal Lesions. *Sec. on Ophth.*, *Coll. Phys.*, Phila., with *Sec. on Oto-Laryngol.*, Dec., 1917. *Amer. Jour. Ophth.*, v. 1, p. 353.

### PATHOLOGY.

- Landolt, M.** Heredity and Somatic Changes. *Arch. d'Opht.*, v. 36, p. 35.

### GENERAL DISEASES.

- Bram, I.** Exophthalmic Goiter. *Arch. of Diag.*, v. 10, p. 343.
- Brinkerhoff, N. M.** Wassermann Findings in Ophthalmic Disease. *Amer. Jour. of Ophth.*, v. 1, p. 322.
- Collins, J.** Nervous Manifestations of Ocular Syphilis. *Amer. Jour. Med. Sc.*, v. 155, p. 649.
- Dobson, L.** Acute Infective Ophthalmoplegia or Botulism. *Lancet*, April 27, 1918, p. 615.
- Dunn, J.** Probable Cause of Exophthalmic Goiter. *Arch. of Ophth.*, v. 47, p. 248.
- Hall, A. J.** Toxic Ophthalmoplegia. (Botulism). *Lancet*, April 20, 1918, p. 568, 580.
- Harris, W.** Acute Infective Ophthalmoplegia or Botulism. *Lancet*, April 20, 1918, pp. 568, 580.
- Holden, W. A.** Eye in Nervous Disease. (3 ill.) *Arch. of Ophth.*, v. 47, p. 221.
- Juarros, C.** Cortical Hemianesthesia Plus Oculomotor Paralysis, Nystagmus and Myopia. *Med. Ibera*, Feb., 1918, p. 168.
- Loeb, C.** Amblyopia ex anopsia Aggravated by Hysteria. *Ill. Med. Jour.*, May, 1918, p. 261.

- Repeated Titles. **Weekers and Firket.** (v. 1, pp. 50, 80.) *Amer. Jour. Med. Sc.*, v. 155, p. 771. **Youdine** (v. 1, p. 80). *Amer. Jour. Med. Sc.*, v. 155, p. 771.

### HYGIENE.

- Monson, S. H.** Conservation of Vision Classes. *Cleveland Med. Jour.*, v. 27, p. 245.
- Shastid, T. H.** Ophthalmia Neonatorum Law. *Amer. Jour. Ophth.*, v. 1, p. 377.
- Spectacles for Soldiers.** *Brit. Med. Jour.*, April 6, 1918, p. 406.

### OPHTHALMIC SOCIOLOGY AND HISTORY.

- Chance, B.** Ophthalmic Examination of Drafted Men at Camp Jackson. *Amer. Jour. Ophth.*, v. 1, p. 318.
- Keller, H. A.** The Story of My Life. 451 pp. 8vo. New York, Grosset and Dunlap.
- Loeb, C.** Institution for Education of Blind Soldiers. *Amer. Jour. Ophth.*, v. 1, p. 374.
- Visual Requirements for Aviators.** *Brit. Jour. Ophth.*, v. 2, p. 278.

# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 1

JULY, 1918

No 7

## WAR AND NIGHT BLINDNESS.

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The author serving as Reserve Surgeon in the Belgian Army in the Field, reports his own experience covering the period from October, 1915, to February, 1918, gives an account of the conditions probably producing night blindness and its simulation, with discussion of causes, especially disturbance of the intraocular circulation.

The night blindness of soldiers continues to be a real problem on the Belgian front. At the beginning of the year 1916 Weekers (*Archives d'Ophthalmologie*, v. 35, p. 73), had described numerous cases which had presented themselves from January to October, 1915. At the latter date the consultations in ophthalmology were established in the hospitals of each division of the army.

Among 2,700 patients who presented themselves during a period of 29 months at the office for consultations, of the division to which the writer is attached, 203 complained of not seeing at night. Night vision, always difficult to soldiers free from ocular defects, was to them more difficult, if not impossible. They were afraid of falling into the trenches or shell holes, of missing the foot bridges as they reached them. They were exposed to great risk at night unless guided by obliging comrades.

These 203 cases presented themselves as follows:

1915.	July .....	1
October .....	August .....	8
November .....	September .....	4
December .....	October .....	5
1916.	November .....	11
January .....	December .....	5
February .....	1917.	
March .....	January .....	13
April .....	February .....	7
May .....	March .....	6
June .....	April .....	2

May .....	6	November .....	7
June .....	16	December .....	33
July .....	5		
August .....	-	1918	
September .....	1	January .....	12
October .....	1	February .....	4

Most of these men were from the ranks, only two being officers. From the point of view of refraction these 203 cases were divided as follows:

Emmetropes 66, two having corneal scars.

Hyperopes less than 1 D., 14.

Hyperopes 1 D. and more, 50, of whom one had corneal scars.

Astigmatic hyperopes, 20, one with lenticular opacities.

Myopes, 31 (two cases of retinitis pigmentosa).

Astigmatic myopes, 16.

Having mixed astigmatia, 4.

We exclude from our statistics the 2 cases of retinitis pigmentosa which cannot be considered as night blindness of war. At the beginning of November, 1917, I made an investigation of the sincerity of those reporting hemeralopia. Among 27 cases regarding which responses were obtained from the commandants of the companies, the diagnosis of hemeralopia was confirmed in 18 cases, and 9 cases were clearly chargeable to simulation. I count equally among simulators the men lacking in sincerity in claiming diminished visual acuity by daylight,



and detected in falsehood by tests for simulation. Among these I find 11 cases. I also count as simulators 2 cases, who claimed hemeralopia but who also presented a provoked conjunctivitis.

It is certain that I have not excluded all the simulators, and that a certain number have passed unperceived. Neither must we neglect those other factors of error, the exaggerators—the simulators, sincere and partly sincere. The soldier exaggerating the accidental occurrences of war does not hesitate to transform a slight difficulty of night adaptation into almost total blindness.

I have had occasion to reexamine a large number of hemeralopes. Among them 22 were said to be completely cured, some by wearing of glasses, some by internal treatment with arsenic and strychnia, and others simply by rest.

Among 86 men I have questioned on the beginning of their affection, 23 claimed to have been attacked before the war; but 63 had done satisfactorily their night service during a part of the campaign, and had been attacked by night blindness only subsequently.

I believe we can class the hemeralopes that I have examined in the following manner:

1. Hemeralopia with retinal lesions.
2. Hemeralopias of congenital origin.
3. Optical hemeralopia, (by errors of refraction uncorrected, by clouding of the media).
4. Hemeralopia without lesions (essential). Corrected errors of refraction. Emmetropia.
5. Exaggerators and simulators.

The hemeralopia of patients attacked with pigmentary chorioretinitis is a constant symptom, showing itself in the case of sclerosis of the retinal and choroidal vessels of syphilitic origin, and going on to secondary atrophy of the chorio-capillaris and external layers of the retina.

For explanation of congenital hemeralopia Truc suggests a deficiency in the rods or in the visual purple; and

that congenital night blindness can have passed unperceived in soldiers who were affected. It required long duty in darkness rendered necessary by war, to make them discover a defect in adaptation, which their previous life had never caused them to notice.

The cloudiness of the transparent media (scars and opacities) hinders the entrance of the light rays into the eye, diminishing the acuteness of day vision, and is a good reason the men affected should have a night vision inferior to that of a normal man. The myope, like the uncorrected astigmatic, having an inferior visual acuity by day, it is evident that his vision is likewise diminished at night.

Walking myself in the evening in the unlighted cantonments at the front on a dark night, wearing strong convex lenses, the difficulty experienced was very great. I was obliged to take the arm of my companion, on the way that I knew perfectly; and I encountered obstacles, not even suspected. The experience is easy to try. The defective vision, accentuated with the myope during darkness, by enlargement of the pupil, diminishes further the clearness of the retinal images.

Landolt recognizes several causes of hemeralopia in corrected myopes.

1. With equal pupils in the corrected myope the retinal image is less brilliant than in the emmetrope.

2. Wearing of correcting glasses renders the image more clear, but less luminous. The correcting glass reflects a part of the light, and the point of reflection interferes with the sight.

3. The light at night furnishes a predominance of blue rays, the most refrangible, which give a focus more in front of the retina than do the other radiations.

4. A last cause, indicated equally by Magitot, is the effect of elongation of the myopic eye on the ocular membranes, and particularly on the vessels and pigment epithelium. In the hemeralope without lesions, but with an error of refraction corrected, Landolt has never encountered hyperopes. We, on the contrary, have encountered a large number of hyperopes, of which

several were confirmed after minute prolonged investigation.

What are the general causes which may produce this condition?

Without going into the details of the daily ration of the Belgian soldier, we know by calculation, based on the energy value of 3,100 calories, it constitutes a sufficient food to make good the loss occasioned by the labors of war. Theoretically fresh legumes are insufficient, but during most of the campaign, at one meal daily, potatoes, a food which may be eaten daily, replaced the legumes.

The habitual beverage of the Belgian soldier is coffee, weak enough to be free from toxic influence. Alcohol is completely prohibited on the Belgian front. Acute alcoholism through beer is a rare exception.

The soldiers smoke enormously, but tobacco amblyopia never produces nyctalopia. In our cases of hemeralopia we have not found central scotoma. In hemeralopia from malnutrition or cachexia, we know, there frequently exist spots of xerosis, called spots of Bitot, on the conjunctiva. We have never encountered these among our patients.

Weekers remarks, very justly, that the Belgian soldier is healthy; his age is a factor for health, and the race is robust. Arteriosclerosis is rare. Nevertheless with the long duration of the campaign causing fatigue and depression, it is a fact that while the outward appearance of the men is that of normal health, they present an irritability of the cardiac muscles under excitement. When in repose it is normal. However, when the men march, for one-half hour for example with their complete equipment (35 kilograms, 77 pounds), it frequently causes tachycardia.

If we review the causes of physical overwork, the violent moral and emotional disturbances of war, and the severe fatigue, it is evident these must be reflected in the function of the heart muscle. These temporary disturbances of circulation by cardiac fatigue must be represented in the functioning of the choriocapillaris, affecting the deli-

cate pigment epithelium of the retina and the secretion of the visual purple.

I have said above that hemeralopia belongs almost exclusively to the foot soldier. To reach the trenches he must go, often several leagues, on foot with his complete equipment; and in the trenches his emotions are violent and sleep limited, so that the cardiac fatigue is greater. In the bad sectors the causes of fatigue and emotion are increased, and constantly the number of cases of true hemeralopia will naturally be increased. Again the number of malingerers here encountered would be greater.

In my opinion the causes indicated by Weekers, overwork and nervous exhaustion, are the real factors in hemeralopia. But I am led to believe that the immediate exciting cause is circulatory disturbance of the choriocapillaris.

The means of investigation which are at our disposal at the front are quite limited; the occupation of the country, always provisional and transient, does not permit of tests with the adaptometer, nor even to test conclusively the light sense. I have in a systematic manner sought the lesions described by Sexe, Augstein and Jess, with all my consultants; but am not able to draw from them diagnostic conclusions.

Perimetry has shown in the majority of cases of confirmed hemeralopia a diminished field for colors, contraction of the periphery for green. I have, however, also recorded the visual field as normal. I have never encountered contraction of the visual field below, described as characteristic by Wolffberg. The method with smoked glasses, proposed by Cantonnet, has given no more result for confirmed hemeralopia. The men admit no greater diminution of visual acuity when furnished with smoked glasses, than do normal men subjected to the test.

The practical means available at the front for such an investigation are: the inspection of the men, and their observation by the commander of the company; these being naturally care-

ful and prolonged. For treatment we have the exact correction of errors of refraction, attention to the underlying condition, treatment of conjunctivitis and keratitis, which often accompany hemeralopia.

Attention to internal remedies as the giving of extract of liver, cod-liver oil, or calcium lactat. Arsenic, iron and strychnin sometimes give encouraging results. In severe cases rest for several days may be indicated.

The management of this condition at the front should recognize:

1. Hemeralopia accompanying retinal lesions is incompatible with service in the army; the patient should be sent to the rear.

2. In other cases a minute inquiry is necessary. If existence of hemeralopia is confirmed, the soldier must be

excluded from isolated night duty, as sentinel, patrol, signal-man, or observer in small posts. He must remain for the time with the bulk of his company. If, however, in the end he becomes too great a hindrance, he should be retired. The simulator must suffer the necessary penalties.

In brief: The hemeralopia of soldiers is a well established affection. The night life of the soldier brings to light a certain number of cases of congenital night blindness. Errors of refraction and clouding of the transparent media can be considered as causes of hemeralopia. The excessive strain, physical and moral, occasioned by war has produced cases of real hemeralopia, by bringing about circulatory disturbance in the choriocapillaris, causing a defect in the mechanism of retinal adaptation.

## WHIP-CRACKER INJURY OF THE EYE.

WITH A REPORT OF THREE CASES.

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Attention is here called to an unusual and puzzling form of ocular injury, and to a defect in the diagrams used in the localization of foreign bodies shown in X-ray pictures. This paper was read before the American Academy of Ophthalmology and Oto-Laryngology, October 30th, 1917.

It has been a task to attempt adequately to express in the title of this communication its real meaning; whip-cracker injury does not express it, for the end of the whip or cracker did not come in contact with the eye. The real trauma was inflicted by a flying bit of fine brass wire which was plaited or braided into the end of the whip, or what is commonly called the cracker. At first thought it is almost inconceivable how a bit of fine wire No. 31 gauge, could penetrate into the eyeball or actually traverse the entire length of an eyeball and lodge in the posterior sclera, but nevertheless this

has been demonstrated by the cases to be reported.

The whip generally used by teamsters has a long lash so that in swinging the whip it is not unlike the long arm of a lever, the velocity which the end or cracker acquires and the distance which it travels is greatly augmented and limited only by the length of the lash and the force with which it is hurled. After giving the subject of velocity some thought and endeavoring to calculate the velocity of the end of a whip, after a vigorous crack, the writer feels that he is not exaggerating in the least when he



states that the ultimate velocity of the cracker is certainly more than 1,000 feet per second and perhaps nearer 10,000 feet per second. Some idea of this apparently immense velocity may be visualized when we stop to think that sound

Examination showed that the right eye had a bit of something protruding from the cornea at the limbus at the vertical meridian above, but still within the clear area of the cornea. A closer inspection showed the other end, which apparently

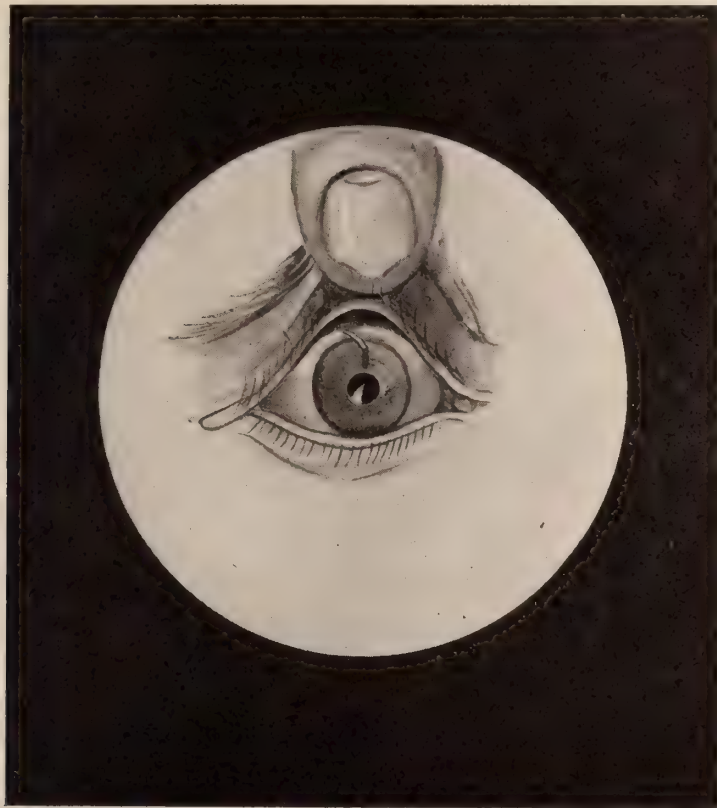


Fig. 1. Drawing showing wire in eyeball of case one.

travels at the rate of about 1,100 feet per second.

It has been the good fortune of the writer to see three cases the result of a flying bit of brass wire from the end or cracker of a whip. The first case was simple but paved the way for the recognition of the next two cases.

#### REPORT OF CASES.

**CASE 1.** July 13, 1910, K. K., aged 27, consulted the writer about his right eye. He stated that while driving his horse and using his whip on the previous day a bit of something from the end of his whip flew into his right eye.

was a piece of wire, in the anterior chamber. The foreign body was removed and proved to be a piece of brass wire, No. 31 gauge, 7 mm. long. The eye made an uneventful recovery.

**CASE 2.**—Dec. 4, 1915, M. R., aged 23, consulted the writer about his left eye which, he stated, had been injured by a piece of brass wire from the end of a whip on Nov. 30, 1915. He had been under observation and treatment from that date by some one near his home. Examination showed that an iridectomy had been done. The lens mass was still clear, the vitreous was cloudy, with no fundus

reflex, and vision reduced to light perception. Having in mind the experience of Case 1 and 'O. W. Holmes' saying, "Never to guess when it is possible to know," a roentgenogram was immediately ordered to determine the presence of a foreign body. Dr. George C. John-

ever, refused, signed a release and left the hospital.

CASE 3.—L. A. D., aged 28, consulted the writer Jan. 18, 1916, with the following history: He had had his right eye injured by a piece of something flying from the cracker of a whip in the



Fig. 2. Drawing showing wire in eye ball (cross section) case one.

ston made the roentgenogram and reported positive findings of what appeared to be a piece of fine wire, 5 mm. long and exactly similar to the piece removed from the eye in Case 1. The roentgenogram showed this foreign body to be a piece of wire and to be located in the posterior part of the vitreous. In view of the condition of the eye and the impossibility of the safe removal of the foreign body, an enucleation of the eyeball was advised. The patient, how-

fall of 1910. His eye was treated at that time, became quiet and remained so until July, 1914, when it again became "sore and painful." The vision by this time had been reduced to light perception. He had his eye treated at this time and it became quiet until December, 1915, when he consulted some one who suggested the removal of the cataractous lens, which the patient, however, refused to have done. When he was seen, Jan. 18, 1916, examination showed the right

eye quite pale, and no ciliary injection; cornea, clear; the pupil contracted and fixed; the lens mass opaque.

Having in mind the experience of Cases 1 and 2 a roentgenogram was immediately ordered, which was made by Dr. George C. Johnston, with positive

Immediately after the enucleation a search was made in the orbit for the foreign body but none was found. On examination of the enucleated eyeball, however, a dark spot was observed on the sclera at about the posterior pole, which looked very much like a bit of fine wire.

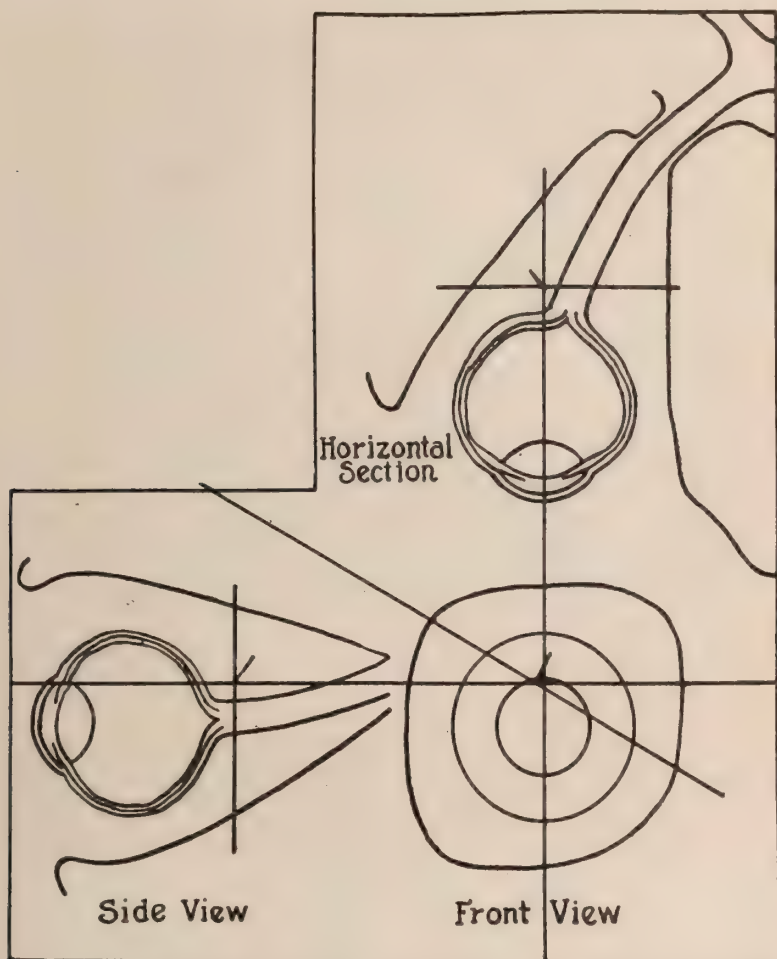


Fig. 3. Diagram showing localization of foreign body in the orbit back of eye ball in case 3.

findings. The roentgenogram showed a foreign body (as per diagram) apparently a piece of wire about 5 mm. long and apparently the same gauge as that found in Cases 1 and 2. Localization showed this foreign body just outside of the posterior sclera. Enucleation was advised and done a few days later.

This was cut into with a small knife and was suspected to be the bit of wire. The enucleated eyeball was sent to the laboratory of Dr. George C. Johnston without any history or comment whatever, but with the simple request that a roentgenogram of the enucleated eyeball be made.

These roentgenograms showed a bit



of fine, No. 31 gauge, wire located in the posterior sclera at the suspected point. Thus demonstrating conclusively the premises and proving the immense penetrating power of so fine a bit of wire for so great a distance.

scarcely probable that these individuals supplied the brass wire themselves, as Case 1 was a resident of Pittsburgh, and Case 2 was a resident of Clarion County, Pa., and Case 3 was a resident of northern Allegheny County.



Fig. 4.—Drawing of the posterior view of enucleated eyeball showing the wire imbedded in the sclera, near the entrance of the optic nerve, case No. 3.

The writer has had several of these what might be called border line cases, in which a foreign body was localized at a point where it was impossible to tell accurately whether the foreign body was within or without the limits of the eyeball, so that he feels that the diagrams in use show the eyeball to be perhaps one or two mm. too small in diameter. This has been impressed so strongly on the mind of the writer that he anticipates making this a study for a separate and future communication.

The writer has made some inquiry from dealers in whips and he has learned that it is not a common practice to incorporate brass wire in the cracker of a whip. But that some whips are made this way, there can be no doubt as illustrated by the three cases recited. It is

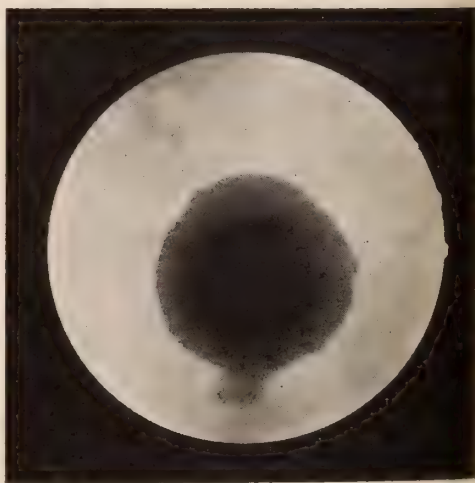


Fig. 5. Roentgenogram of enucleated eyeball, showing the wire near optic nerve. Case No. 3. (The enucleated eyeball and X-Ray plate were shown at the meeting.)

# CONCOMITANT MOVEMENTS, ESPECIALLY OF THE UPPER EYELID, WITH SUCTION.

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This paper gives a survey of the physiologic typical associated movements of the eyes and lids, and of physiologic atypical, and pathologic, concomitant movements in general. It discusses the paradoxical movements of the upper lid with mastication and suction, with report of an illustrative case, presenting the different views of explanation of these phenomena, with consideration of anatomic and physiologic researches and clinical observations. Read before the Milwaukee Medical Society April 23, 1918.

Concomitant or associated movements are movements which occur against, or at least without, our will, simultaneously with intended voluntary movements. They may be physiologic or pathologic. The physiologic associated movements follow either constant laws and are typical, or are entirely incoherent and show individual differences. The positions and motions of both eyes, by their mechanism of innervation, are so intercombined that they can never be executed independently, but only in certain combinations or associations, and partly with certain other movements.

According to Hering's law of equal innervation, both eyes, with regard to their movements subservient to the visual sense, are used as a single organ. For the moving will power it is irrelevant that this organ in reality consists of two different parts, because it is not necessary for the will to move and govern each of these parts separately, since one and the same impulse directs both eyes simultaneously just as a team can be guided by single reins. These associated movements of both eyes are binocular elevation and depression, the binocular lateral movements and the combinations of both these movements in oblique planes, and convergence and divergence of both eyes. Further, associated innervations for rotations, association of convergence with accommodation and width of pupils, and the less fixed movements of the eyeballs with those of the lids and the head.

These associated movements of the eyes are so constant, that they also take place independently of the posture

of seeing, e. g. in an eye that has been covered up, or a blind eye, and also in children born blind.<sup>1</sup> Their impulse persists even in ocular palsies leading to double images which could be avoided by separated fixation of each eye. Most ocular movements of new born children are associated, although they occasionally show also incoordinated movements like adults when half asleep. As expressed by Hering, the motor correspondence of the retinas has its motor correlation in the correspondence of the movements produced by the association. The movements of the eye are elicited by the psychophisic process of direction of attention, and are executed under the control of the retinal images.

Their association results from a number of anatomic conditions, viz.: The cortical communications through the crossed radiating fibers, the connections of the homolateral nuclei through the dorsal longitudinal fascicle, the transverse connections of the paired nuclei, the partial crossing of the oculomotor nerve and the total crossing of the 4th nerve. The constancy of the origin and termination of the systems of fibers insures the constancy of the chief types of associated ocular movements and explains the physiologic range of limited variability of certain associations under conditions artificially created.

The physiologic proof of the existence of the transverse connection of the homonymous nuclei of the ocular nerves has been furnished by Bernheimer in the monkey<sup>2</sup>. After separation of the paired nuclear region by a median section, the synergic ocular

movements cannot be performed, but the animal moves his eyes irregularly, each for itself, independently of the other.<sup>1</sup>

The associated movements of the upper lid and the eyeball are elevation of the lid by contraction of the levator palpebrae, with the moving of the eye upwards by contraction of the superior rectus, and depression of the lid with the downward motion of the eye. This synergy of the levator palpebrae and superior rectus rests on anatomic conditions. The space between these muscles is filled by a bundle of fascia which connects both so firmly, that, aside from the action of the levator, also a contraction of the rectus will effect a raising of the lid (Merkel). Both muscles are supplied by the upper branch of the oculomotor nerve, and the nuclei for the innervation of both lie so near together, that a sharp differentiation of their borders is not possible. Therefore it is not unlikely that a stimulation of the nucleus of the superior rectus may, on preformed anatomic paths, entail also a corresponding excitation of the nucleus of the levator. The tonus of the levator keeps the palpebral fissure open.

A participation in the elevation of the upper lid has also been ascribed to the smooth fibers of the tarsalis superior muscle and, von Graefe's symptom in Graves' disease, viz., the lagging behind of the upper lid in looking downward has been explained by a spastic contraction of this muscle. According to Sattler's investigations, however, the function of the tarsalis muscle consists simply in keeping the lids in close contact with the eyeball in all its movements and positions. Its supposed contraction in other morbid conditions, in which abnormal contractions or spasms of the upper lid are encountered, is not very probable, since most of these conditions are complicated by other disturbances in the innervation of the oculomotor nerve.

The depression of the upper lid is partly due to contraction of the palpebral portion of the orbicularis muscle, to relaxation of the levator, to gravitation, and to the anatomic connection

with the superior rectus which carries the lid along with the downward movement of the eye. If this connection is very loose, the eyeball moves down first and the lid follows. Blaschek<sup>3</sup> found in a group of normal individuals in adduction of the eyeballs elevation, and in abduction depression of the upper lid, as physiologic concomitant movements, and in another group the opposite behavior. Beer<sup>4</sup> maintains that there exists a constant physiologic synergy between the muscles of mastication and of the tongue on the one hand, and the ocular muscles on the other. On lateral movements of the eyes the muscles of mastication of the same side contract and the tongue deviates to this side. Vice versa the eyes move a little on voluntary movements of the muscles of mastication and of the tongue.

Certain pathologic cases of nuclear palsies, reported by Wilbrand and Saenger might suggest the existence of a center of association for the superior rectus, inferior oblique, and levator; the accidental combination of diseased nuclei giving the appearance of a paralysis of a supposed association center. The authors, however, consider the assumption of such a center superfluous, because, as for reasons of expediency from earliest infancy the upper lid has been raised in looking upward, the common innervation of the elevators of the eye and the levator has become habitual with mankind, just as the simultaneous innervation of the internal recti and the muscle of accommodation in near vision.

Numerous instances of physiologic inconstant or atypical concomitant movements, can be mentioned. A new born child brings a multitude of muscles into activity, of which only a few would suffice if a localization of the impulse for appropriate motions were developed. The same occurs in adults in the attempt of contracting rarely used muscles, or in learning certain physical achievements. If one tries to move one's ears, one generally will contract, aside from the auricular muscles, also the muscles of the scalp or the face. In attempting to raise or lower the wings



of the nose he will wrinkle his forehead or close his eyes. Children, or persons with inflamed eyes and photophobia, who have no control over their muscles, when asked to open their eyes, can do this only if they open their mouths, perhaps with the purpose of exerting a traction on the lower lid by the downward movement of the skin of the upper lip, or contract the frontalis muscle for helping to raise the upper lid<sup>5</sup>. At present I have a patient who habitually contracts the wings of the nose with each blinking movement. Popolanski<sup>6</sup> observed in a large number of cases with each contraction of the orbicularis a simultaneous contraction of the wing of the nose.

The beginner at the violin, or other musical instruments, at singing, dancing, riding, or other gymnastics, accompanies the required movements with numerous superfluous concomitant motions, until sufficient training enables him to suppress these. Their absolute exclusion is the characteristic of the accomplished athlete, acrobat, or virtuoso, and indeed the absence of gestures is an attribute of the educated gentleman.

Also in ordinary movements concomitant contractions of muscles or groups of muscles may be observed, if carried out with intense exertion, as contortion of the face, in lifting heavy weights, the participation of the muscles of the forearm and finally of the upper arm in pressing an object very hard with the thumb, or the contraction of the tensor tympani during forced compression of the jaws by the muscles of mastication. The cause of all these concomitant motions is generally ascribed to irradiation of the motor impulse in the grey substance of the central nervous system, in the cerebral cortex or in the medulla or spinal cord.

In pathologic conditions it is not rare that the hemiplegic limbs are moved simultaneously with active motions of the muscles of the healthy side, or in yawning, coughing, sneezing, etc., that the paralyzed hand contracts to a fist with shaking of the healthy hand, or the closed hand opens on yawning. Also the

opposite occurs, that the active movements of the formerly paralyzed and still paretic muscles, or the attempt of contracting them is accompanied by corresponding movements of the muscles of the healthy side.<sup>7</sup> Hereditary compulsory concomitant movements of the muscles of one extremity on innervation of the symmetrical muscles of the other have been described, in which e. g. the left hand simultaneously imitated the movements of the right hand.

These cases are in accordance with experiments of stimulation of the motor cortical areas by Hitzig, in which, added to the contralateral movements, movements of the extremities of the stimulated side also occurred. François-Franck, Pitres, and Lewaschew proved that the homolateral movements resulted, not from direct homolateral conduction, but through crossed paths and transverse conduction in the spinal cord, e. g. after a section through the right half of the dorsal cord on stimulation of the right cortex the bilateral reaction of the lower extremity remained.<sup>8</sup>

A great variety of paradoxical concomitant movements of the eyelids have been observed, which occur against the general rule of lid movements, and are not to be expected even under pathologic conditions. They are associated with movements of the eyeball or with other groups of muscles. The most peculiar of these is the syndrome of one sided involuntary raising of the upper lid with the innervation of the muscles of the lower jaw, tongue, pharynx and face. About 87 cases have been reported since Marcus Gunn, in 1883, first demonstrated one before the ophthalmological society in London.<sup>9</sup> This condition is called in France "Mâchoire à clignements" and in England "jaw winking."

With few exceptions the affection was congenital and stationary. In a few it seemed to have developed through a cerebral disease. In a few the symptoms became less marked or subsided entirely. In others they became more intense, so that the prognosis must be guarded. In the majority, e. g. in 58 out of 71 cases, collected by Bielschowsky,<sup>10</sup> the upper lid showed more or less congenital ptosis, which was absent in

9; other congenital ocular palsies in 17, most frequently of the superior rectus (in 13 cases). The lifting of one upper lid most commonly occurred on opening the mouth in speaking, in singing and chewing, and more intensely on lowering the jaw, or moving it to the opposite side, which is done by the homolateral external pterygoid muscle, or both; in a case of Friedenwald<sup>11</sup> also to the same side, in others in swallowing or blowing the cheeks.

#### CASE.

Last November I observed the following case: A boy, aged 8 months, when drinking out of the bottle and looking down at it, raised his right upper lid synchronously with each suction movement, so that the upper part of the sclera became visible. The same movements, although not as intense, were observed when he ate a cracker, while looking down. The upper lid of the left eye remained in its natural position. The movement of the lid ceased, as soon as he stopped drinking, and returned with its resumption. When his attention was attracted by an object held before him and this was moved upwards, so that he followed it with his eyes upwards, the movement of the upper lid was arrested, while he continued drinking.

The eyes and lids showed no changes, especially no paralysis, had normal positions, and the palpebral fissures were of equal and normal widths. The child was under treatment of Dr. Kastner for a gastro-intestinal affection, and had a mild otitis media which promptly healed after paracentesis. But the above described phenomenon persisted after subsidence of his digestive trouble, and was unchanged when seen 3 months later.

The case was a very good example of congenital concomitant movement of the right upper lid with that of the muscles enacting the suction process. These are the muscles of the mouth, supplied by the facial nerve, and of the tongue, especially the genioglossus, and those which draw the lower jaw backwards and downwards, the geniohyoid, all supplied by the hypoglossal nerve, the mylohyoid and anterior part of the digastric, supplied by the third branch of the fifth

nerve, the posterior part of the digastric by the facial nerve. The center of suction lies in the nuclei of these nerves.

I found in literature only 3 similar cases. In one of Grimsdale,<sup>12</sup> the paralyzed upper lid was raised and the eyeball retracted simultaneously with the suction movements of the child.

A case of Cockayne,<sup>13</sup> occurred in a healthy looking girl, aged 6 months. The movements were first noticed when she was about a month old. Voluntary movement of the levator was good, and also of the other ocular muscles, pupils equal, reacted to light, no facial asymmetry. As the baby sucked at the breast, the right lid, which showed slight ptosis, was raised synchronously with the movements of the jaw, so that a little sclerotic was shown above the cornea. As the jaw was moved away from the side of the lesion, as in grinding the teeth, the lid was raised. An almost imperceptible lateral movement was sufficient. The left lid was not moved, and the right eye itself remained stationary. Slight sucking movements produced no movement of the lid. When the baby yawned or laughed, the lid was retracted to an extreme degree and showed a large extent of sclerotic. The movements were diminishing in frequency and in extent.

Sym<sup>14</sup> observed in a woman, aged 30 affected with ptosis, that especially in chewing and sucking the upper lid moved far upwards, so that the upper part of the sclera became visible.

For the explanation of this abnormal association between the muscles of the lower jaw and the levator, a number of theories have been advanced. Some authors, e.g. Blaschek, consider it as concomitant movement, that may occur physiologically and in some cases assume an unusual intensity. Lutz<sup>15</sup> maintains that the phenomenon cannot be interpreted as an abnormally intense physiologic, but rather as a pathologic, concomitant movement in the sense of Oppenheim, on the order of those mentioned above. It certainly is not a typical physiologic concomitant movement, at the inconstant show, as we saw, a great variety and irregularity in different individuals.



But numerous cases of this kind presented in all essential details such an identical behavior, that the assumption seemed very plausible, that the nerve of one levator arises partly or exclusively from the nucleus of the motor part of the fifth nerve, which supplies the muscles of the jaw. Bielschowsky<sup>10</sup> points out, that in the great majority of these cases the concomitant movement was observed in a congenitally paretic upper lid, which suggests a causal relation between a process which led to the paresis of the levator and the transition of a number of motor fibers of the 5th nerve into the roots of the oculomotor nerve.

A portion of the fibers of the 5th nerve, supplying the muscles of the jaw, does not originate in the motor nucleus in the dorsal part of the pons, but in a series of ganglion cells, scattered in the lateral wall of the Sylvian aqueduct, near the nucleus of the oculomotor nerve, viz., the mesencephalic root of the 5th nerve. This is a favorable condition for the aberration of some of these fibers into the roots of the oculomotor nerve. Bielschowsky thinks that such a possibility may also be assumed for cases with normal oculomotor nerve, if they are congenital and stationary. Lindenmeyer<sup>16</sup> believes that cases in which the phenomenon developed later in life are doubtful, considering the uncertainty of anamneses, given by patients or their relatives; and those in which the affection subsided are so few in number that, according to Bielschowsky, they cannot refute the assumption of preformed connection of the levator with nuclei of other nerves.

The English commission, appointed to give a decision on the case, presented by Marcus Gunn, reached the conclusion, that the upper lid, influenced by the movements of the jaw, received nerve fibers from the nucleus of the 3rd branch of the 5th nerve, which supplies the external pterygoid muscle. As the anterior part of the biverter maxillae is supplied by the 5th nerve, the posterior by the facial nerve, Helfreich assumed an innervation of the upper lid from the nuclei of the 5th and facial nerves; and Bernhardt thinks of the possibility that

also the nucleus of the hypoglossal nerve participates in the innervation of the levator, since the muscles which fix the hyoid bone for the action of the muscles that open the mouth, are supplied by the hypoglossal nerve. In those cases in which the movements of the upper lid were associated with swallowing, which is governed by the 3rd branch of the 5th, the hypoglossal, glossopharyngeal, and pneumogastric nerves, one would have to assume a connection of the nerve for the levator with the nuclei of these nerves.

Is there an anatomic connection between these nerves? From a combination of anatomic researches and physiologic experiments, especially in monkeys, this question can be answered in the affirmative. Crossing of the fibers, not only of the 4th nerve, but of all from the 3rd to the 12th cranial nerves, and communications of the nerves between each other are, according to Merkel,<sup>17</sup> most likely. These communications most probably gather in the dorsal longitudinal fascicle, which is encountered in all cross sections of the mesocephalon to the medulla oblongata, where it is found next to the raphe and near the surface of the rhomboid fossa. It is an immediate continuation into the anterior fascicles of the spinal cord.

One can observe with certainty that the nuclei of the nerves of the ocular muscles are connected with each other in the longitudinal fascicle, and Merkel says one may not be wrong in assuming in it also connections with other cranial nerves. Thus van Gehuchten found in the duck that the fibers of the longitudinal fascicle give collaterals to the nucleus of the hypoglossal and to the nuclei of the nerves of the ocular muscles. Bernheimer ascertained radiations from this fascicle into the homolateral nuclei of the 3rd, 4th, and 6th nerves. According to von Kolliker, von Bechterew, van Gehuchten, and Spitzer, the longitudinal fascicle contains long and short ascendent and descendent fibers. This shows the physiologic importance of this fascicle.

Bernheimer (p. 82) assumes that the nucleus of the auditory nerve by anatomic relations with the abducens



connects through the longitudinal fascicle with the other motor nuclei of the ocular nerves. On this path the well known reflex ocular movements after sound impressions may be elicited. According to the comparative anatomic researches of Ziba,<sup>18</sup> the dorsal longitudinal fascicle in certain classes of animals most likely is the only reflex path for changes of the tonus of the ocular muscles dependent upon the labyrinth. He found that its magnitude varied not only in different classes of animals, but also in different species of the same class, being greater in types of more lively movements; as these are more frequently apt to get out of position of equilibrium and require labyrinthine ophthalmostatics in a higher degree, than the more slowly moving animals, Ziba infers, that the longitudinal fascicle is in intimate relation to the mobility of the animals.

Thus as an anatomic connection between the nuclei of the different cranial nerves seems to be established, it does not appear improbable that under certain physiologic deviations or pathologic conditions, associated movements of the upper lid on innervation of the nuclei of other cranial nerves may be elicited along these paths. Lutz<sup>15</sup> opposes the theory of abnormal nuclear connection of the levator fibers, saying that it does not explain the cases without ptosis, nor those which developed during life, nor those in which the phenomenon subsided, and is very improbable if more nuclei than that of the 5th nerve are involved, e. g. in swallowing.

He argues: "all these cases have in common that the abnormal movement of the lid occurs with the so-called common or principal movements of Munk, the phylogenetically old, congenital, or soon after birth acquired, acts, as chewing, swallowing, etc., which are innervated from the subcortical motor centers, while the cortex of the brain gives only the impulse and regulation to these movements. They do not set in with the separate movements of Munk, the finely graduated muscular achievements, e. g. wrinkling of the forehead, which are entirely dependent on the motor zone. With the

assumption of a defective congenital or acquired isolation of these subcortical centers a propagation of a stimulation upon a neighboring path, e. g. the levator may be thought of, which in the cases without ptosis would be intact, or otherwise damaged farther upwards, and thus could not be used voluntarily. Where the disturbance is situated, whether in the optic thalamus, whose lesion is distinguished by markedly frequent disorders of coordination, cannot be determined on account of our insufficient knowledge of the supranuclear centers."

"Demaria and Caldora"<sup>19</sup> have quite recently described a case with slight ptosis disappearing and leaving exposed a part of the sclera above the cornea when the inferior maxilla was drawn downward in mastication. "The elevation of the upper lid attained its maximum when the jaw was moved laterally in the opposite direction from the affected eye. The other ocular muscles were normal, but the pupil was larger than that of the other eye, although its reactions to light, accommodation, etc., were not impaired." On account of the anisocoria the authors claim that the trouble must reside in the cortical centers near the foot of the frontal convolutions, which are probably connected with each other by Meynert's U fibers.

In a case of Menacho,<sup>20</sup> a girl, aged 20, with normal eyes, no ptosis, nothing particular was noticed until the age of 12, when it was observed that when she masticated the right upper lid retracted. "The movement of the right upper lid occurred only on depressing the mandible for mastication but not on moving it laterally. In view of the actual state of our knowledge, Menacho does not feel justified in making an exclusively anatomic explanation. He believes that careful observation shows the close relation between the functions committed to the cranial nerves, that we must attribute it, *a priori* to associations on a level with the nuclei of origin, or among the subcortical centers, or in the cerebral cortex, and that these paths of communication, which physiology presents and anatomy tries to confirm, can be dis-

placed functionally by inhibition or by irritation, and this would explain, provisionally, this interesting phenomenon. The anatomic theories meet, according to Menacho, the indestructible argument in the acquired cases: How explain in these the establishment of anatomic associations of new formation, not only among the immediate nuclei, as those of pair III and the masticatory nucleus of V, but in those in which the association had to take place among those of III, V, and XII, and others? How explain those in which the phenomenon disappeared?"

It seems to me that, with consideration of the above discussed anatomic relations between the nuclei of other cranial nerves, and those of the nerves of the ocular muscles thru the longitudinal fascicle, an abnormal propagation of excitation may as well occur there, as in the subcortical ganglia or the cortex.

I would like to bring out another point, which has not been explained by the authors, viz., that in our case and in most others the lid phenomenon occurred only when the patient looked down, and stopped when he was induced to look up, while the suction or mastication continued. This has some resemblance with the cases of paralysis of the oculomotor nerve of Bielschowsky and Sölder, in which the levator, which was paralyzed for direct innervation, contracted on the impulse of downward fixation. It suggests the possibility that the phenomenon was an associated movement with the action of the inferior rectus, and was not directly dependent on the movement of the lower jaw, but only indirectly by means of the inferior rectus in so far, that with these movements was combined a contraction of the inferior rectus, stimulated by the natural psychic impulse of intense downward fixation.

As we saw, under the discussion of the physiologic concomitant movements, that some of these set in only in conjunction with very intense actions, thus in our case the phenomenon did not occur when the patient simply looked down, but immediately started when he commenced to suck

with intense downward fixation, being exclusively interested in his bottle. Then we would have a connected abnormal innervation of different parts of the nuclei of one and the same nerve, of the oculomotor nerve, instead of having to assume a connection between the nuclei of the oculomotor and 5th and other nerves. In that case a plausible explanation could be given on the basis of anatomically and experimentally proven facts, from the observations of Lipschitz,<sup>21</sup> on concomitant movements in the course of paralysis of the facial nerve which he attributes to intermixture of fibers, supplying different muscles of the face, during the healing process. Bielschowsky thinks that if a portion of the roots or fibers of the oculomotor nerve with the sheaths of Schwann were destroyed, there was a possibility that not all of the regenerating fibers found again their old paths and the muscular fibers in which they terminated before the lesion. They rather landed in greater or lesser numbers in foreign paths, of which those ending in the levator palpebrae seem to be especially accessible, in his cases for fibers originating in the nucleus of the inferior rectus. This explanation might be applied to the cases in which the lid phenomenon occurred in downward fixation of eyes with paralysis of the oculomotor nerve.

I mention it only as an instance of great biologic interest how a faulty isolation or abnormal combination of different nuclei or roots or fibers of the same nerve, supplying different muscles, and perhaps also of different nerves connected thru the longitudinal fascicle, may occur, and, although observed in pathologic conditions, may, as so many questions of physiology, lead to the understanding of apparently physiologic deviations, perhaps by prenatal processes, which themselves are not evident after birth.

However, if this assumed possibility is fallacious, the arrest of the phenomenon in looking upward, can easily be explained by the preponderance of the natural synergy between levator and superior rectus which holds the lid in

extreme elevation, due to their above described anatomic connections and nuclear relations, over the abnormal innervation impulses from nuclei of other nerves which govern the acts of suction, swallowing or mastication.

## BIBLIOGRAPHY.

1. Zoth. Nagel's Handb. d. Physiologie, III, p. 335.
2. Bernheimer. Graefe-Saemisch, v. 1.
3. Blaschek. Zeit. f. Augenh. v. 13, p. 763.
4. Beer. Wiener. Med. Blätter. 1891.
5. Wilbrand and Saenger, Neurologie d. Auges, 1, p. 64.
6. Topolanski. Wilbrand u. Saenger, 1, p. 64.
7. Oppenheim. Lehrbuch d. Nervenkrank, 3rd Ed., p. 316.
8. Langendorff. Nagel's Handb. d. Physiol. v. 4, p. 292.
9. Neurologie des Auges, v. 1. La Clinique Ophthalmologique, Aug., 1916.
10. Bielschowsky. Graefe-Saemisch, 2nd Ed., v. 8, pp. 223, 224.
11. Friedenwald. Arch. of Ophth. v. 23, 1893, 349. Johns Hopkins Hosp. Bull. v. 7, 1896.
12. Grimsdale. Brit. Med. Jour. 1902, p. 1151.
13. Cockayne. Brit. Jour. Child. Dis. v. 40, p. 337, and Jour. Amer. Medical Assn., 1914, p. 849.
14. Sym. Ophth. Rev. 1908, p. 197.
15. Lutz. Klin. Monatsbl. f. Augenh. v. 49, 1, p. 342.
16. Lindemeyer. Sammlung. Zwangl. Abhandl. d. Augenh. von Vossius, v. 6.
17. Merkel. Grundriss der Anatomie, p. 465.
18. Ziba. Arch. f. Ohrenh. v. 86, p. 189.
19. Demaria and Caldora. Arch. de Oftalm. Hispano-Amer., v. 17, p. 60.
20. Menacho. Arch. de Oftalm. Hispano-Amer., v. 17, p. 640. Ann. d'Oculist, v. 154, p. 240.
21. Lipschitz. Monatschr. f. Psych. u. Neurol., v. 20, p. 84.

## ETIOLOGIC FACTORS IN AN EPIDEMIC OF ACUTE CONJUNCTIVITIS AT CAMP SHERMAN

MAJOR W. E. KERSHNER, M. R. C.

A discussion of the bacterial and mechanical factors concerned in the production of conjunctivitis with statistics of the bacteriologic findings in an epidemic occurring in Camp Sherman near Chillicothe, Ohio.

Conjunctivitis in epidemic form developed at Camp Sherman the latter part of October, 1917, and ran well into January, 1918. An epidemic of conjunctivitis in the army is not unlike such epidemics in civil practice except that it is sure to be more widespread by reason of the crowded condition of the men, and their close association, either at work, at play or at rest.

The barracks at Camp Sherman were large, but not very well heated. One reason for the widespread character of the epidemic was that it began after cold weather had set in, and to make the most of the artificial heat, the ventilation was defective in these rapidly constructed semi-permanent quarters.

In this connection it will be of interest to ask whether there is more epidemic conjunctivitis in the camps where the men are quartered in frame barracks, than in those camps where the men are under canvas. Evidently the same bacterial and mechanical agents are present in both instances in all the various camps. The crowding will be the same but the ventilation is certainly much more thorough in tents than in barracks, whether heated by steam or large stoves.

As regards those cases of conjunctivitis in which no bacteria were found, but in which there was decided conjunctival injection of both the bulbar and palpebral membrane, the question



arises as to whether it could be mechanical; and due only to "cold," dust, smoke and the crowded proximity of men in their beds and at table.

The question of "cold" of course, includes wind with a low temperature, especially the cold alternating with the wind of the drill ground; and out-door work generally alternating with the less humid, warm atmosphere of the artificially heated barracks. This repeated heat and cold, with the attendant laceration, causes an injection of the conjunctival vessels; which develops a decided relaxation of the vessel walls, and infiltration of the conjunctiva, i. e., *mechanical conjunctivitis*.

There were two sources of dust or foreign particles; the dust in the air from sweeping and tramping on the floors of quarters which had not been oiled; and the dust from the roads. These particles of dust in great numbers entering the conjunctival sac produce a reaction; and, with the continual rubbing of the eyes, which their presence encourages, is a source of conjunctival disease, that sends men to the hospital for relief.

This dust aided and abetted by the smoking of the men in quarters, plus the smoke and gas from the stoves might, perhaps, be sufficient to keep the conjunctiva injected; and a source of complaint, besides furnishing a fruitful field for bacterial invasions. The element of smoke alone, as a cause of conjunctivitis, is sufficiently shown by the conjunctivae of the inhabitants of the far north, huddled together in small huts from which the smoke of indoor fires and lamps does not have free vent. The crowding of many men at tables, and the close proximity of beds are a decided assistance in the spread of bacterial infections, more than the production of mechanical conjunctivitis.

Of the bacteria found in the series of cases at Camp Sherman, the organism most frequently present was the pneumococcus, although the other organisms usually found in these epidemics were present in some few cases.

The number of pure Koch-Weeks infections was decidedly small; more so than one would have reason to expect

from the large amount of literature on the subject. Likewise the Morax-Axenfeld infections were quite few. From the above we find a decided change in the order of precedence from the findings of Pollock, Morax, von Meande (Riga) and many other observers.

The bacterial agents in the epidemic at Camp Sherman did compare somewhat with the short series of cases of Veasey, and with the author's records of seventy-eight cases in private practice, observed in the spring and summer of 1916 at Bath, Maine. The cases of Koch-Weeks and Morax-Axenfeld were very mild, and much shorter in duration than many of the cases in which no bacteria were found.

As indicated previously, the striking feature of this epidemic is the large percentage of cases in which our competent and painstaking laboratory experts were unable to find organisms. Not only was the absence of bacterial growths demonstrated, but the secretion and discharge from the conjunctival sac were very limited in amount, even in cases of decided conjunctival reaction.

There were in the series three cases of *gonococcus infection*, one of which was reported by Lieut. Stevenson in the Ophthalmic Record of December, 1917, page 621. Each of these cases probably presented itself earlier than would have been the case if an epidemic of "pink eye" had not "been on" in this camp. At first they showed much the same clinical manifestations as the other cases, and their true nature was demonstrated by the laboratory examination. Because they were seen early, they yielded to treatment readily. As might have been expected in a command in which epidemic meningitis was present, in some few cases the meningococcus was found.

One case of xerosis bacillus infection was demonstrated.

A fair percentage of cases were shown to belong to one of the various types of staphylococci. In one instance only did a serious complication arise. This was a case of severe corneal ulcer with pneumococcus infection of the conjunctiva.

The epidemic was very wide-spread, affecting over twelve hundred men known to the authorities of the base hos-

pital. Many others were diagnosed and treated in the Regimental Infirmarys.

Isolation of the more severe cases was carried out, but it was practically impossible to segregate all. It is believed that a considerable number of milder cases went untreated as they were not reported.

The following table is the result of the

laboratory examinations. The chief bacteria found were:

Pneumococcus .....	37.5%
Staphylococcus (various types) .	6.0%
Meningococcus .....	1.5%
Koch-Weeks bacillus.....	2.5%
Morax-Axenfeld bacillus.....	3.5%
Organisms undetermined.....	9.0%
No organisms.....	40.0%

## DEFECTS IN EDUCATION FOR OPHTHALMIC PRACTICE.

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These defects center chiefly in lack of fundamental training in physiologic optics, anatomy and pathology. They are to be met by graduate courses in these branches in universities and under the auspices of special societies. Paper read before the American Academy of Ophthalmology and Oto-Laryngology. October 30, 1917.

The common and glaring defects in training for ophthalmic practice have arisen from imperfect preliminary and undergraduate medical training; and from the general failure to recognize that ophthalmology includes a mass of special facts and processes that will be acquired only through the personal relation of teacher and student.

At a time when every medical student was expected to learn how to use the stethoscope and clinical thermometer, not one in fifty was given instruction in the use of the ophthalmoscope. The preliminary requirements for entering the medical school took no account of parts of physics and mathematics fundamental to ophthalmology. When ophthalmology was recognized in the curriculum of undergraduate medical study, it was as a clinical branch given near the close of the course, still without recognition of the laboratory work and systematic training, on which alone the sound clinical teaching of it could be founded. Only in the last few years, and still in a minority of schools, have these defects been remedied.

The medical education of the student who has just received his doctor's de-

gree is generally in an embryonic state; but a large proportion of those now engaged in the practice of medicine in this country have a medical education especially defective in respect to ophthalmology, and little opportunity or encouragement has there been to remedy these defects. The postgraduate schools, started a third of a century ago, were wholly clinical. Profitable clinical teaching presupposes a preliminary course of systematic study. The measurement and correction of astigmatism can only be intelligently carried out by one who knows what astigmatism is, and after its relations to emmetropia, hyperopia, myopia, and accommodation are understood. The clinical characteristics of a corneal inflammation become significant in proportion as the observer knows the anatomy and pathologic tendencies of the cornea; and its relations to sclera, conjunctiva, lids, and iris.

The average graduate in medicine lacked the preparatory training that would enable him to profit by the clinical study of ophthalmology. If his teacher had not the same defects, to a degree that made him unconscious of them in the student, he was likely to

become discouraged with the poor material he had to work on; and the misguided would-be specialist spent his six weeks in watching a parade of cases that he never fully understood or could profit by. Teaching so given is necessarily ineffective; and no repetition of such clinical courses could ever give a satisfactory education in ophthalmology. It is still too much the accepted model for ophthalmic teaching.

There has been a great improvement in some schools that give graduate teaching in ophthalmology. Systematic courses are now given extending over three months to a year. And some instruction is given in ocular anatomy, pathology, and optics, along with the clinical work. But the best courses of this kind leave much to be desired; they are not given at all schools; and they are taken by only a minority of those who are preparing for ophthalmic practice. There seems to be no general understanding of the importance of these branches. A few private instructors have stimulated their assistants to do the needful study of these fundamentals. But too often there has been no suggestion to the student that anything more than attendance on a clinic was needed to make him an ophthalmologist.

It has been supposed in the past that an internship in an ophthalmic hospital was a superior opportunity for preparation for ophthalmic practice, and in many respects it is. But on a young graduate in medicine ignorant of ocular anatomy and pathology, and physiologic optics, such an opportunity is largely thrown away. A year or eighteen months' service in such a position may still leave him defective in fundamental knowledge that would have made his internship truly valuable; and leave him unprepared to meet the needs of the cases that will form three-fourths of his work in private practice.

This is not a merely theoretical indictment of our methods of teaching ophthalmology in this country, heretofore. Every point in it has been supported and emphasized by a year's experience in the work of the American

Board for Ophthalmic Examinations. These educational shortcomings appear in the case histories submitted, in the papers produced in written examinations, and in the laboratory and clinical work of the candidates. It is too much to suppose that they will not impair the quality of the service an ophthalmologist so poorly trained can render to the community. I do not for one instant forget that every ophthalmologist now addressed has done something to remedy such defects, some attaining great success, others with but indifferent results. But not one of us is free from the defects entailed by lack of proper training. It is our business to see that those who come after us will have a better chance.

#### PRELIMINARY TRAINING.

There is a proper sequence for the building of a house, or the learning to walk. There is an orderly effective way of bringing together the knowledge we have to use in ophthalmic practice; and learning to manipulate its instruments and apply its facts. Anyone who has worked in ophthalmology can give some hints as to what this order and these facts and instruments are. We who have gone over this ground, however, slowly, laboriously, and by devious ways, can point out to others some of the more direct and easier paths by which they can travel. It is our business to do so, to work out an order in which ophthalmology may be most profitably studied.

The preliminary studies of especial importance, apart from those preparatory to the study of medicine in general, are mathematics, optics, and drawing. Of *mathematics* geometry and plane trigonometry are essential to an intelligent study of optics. So far as I know plane trigonometry is nowhere required as a preliminary to the study of medicine. Yet it is hardly possible for one who does not know something of plane trigonometry to understand the first law of refraction as it is commonly stated.

It is too much to expect that all medical students shall have trigonometry before entering upon the study of phys-



ologic optics. But it is not too much to expect that every physician who proposes to prepare himself adequately for ophthalmic practice shall study plane trigonometry. For such it is time saved. We have required it for the graduate degree in the University of Colorado. The first graduate student to take our course began by hunting up a high school teacher of mathematics, and taking under him a course on trigonometry. This plan is open to any one who lives within reach of a good high school, and the branch is one that can be mastered by a good student from the book alone.

Of algebra not much is required in preparation for an understanding study of ophthalmology; and this is furnished in most college or high school courses that require some mathematics. For advanced study "descriptive" geometry and mathematical drawing will more profitably employ the student's time and energy. It is not too much to ask that any doctor of medicine who expects to take up ophthalmic practice as his specialty, should begin by making good the mathematical foundation necessary for a good and early mastery of physiologic optics.

The needed study of *optics* is possible in any well equipped university or advanced school of physical science. But the opportunities so offered are not particularly attractive or well-suited to the student of ophthalmology. Physiologic optics is a special branch of the science, of interest chiefly to those who have studied medicine. The course arranged by the professor of physics does not go very far in that particular direction, and does give more of other parts of optical science than is needed by the ophthalmologist.

In a way physiologic optics can be studied by the help of books. But it can only be mastered by carefully performed and thoroughly understood experiments. The essential laboratory fittings are neither elaborate or expensive, but it should be largely a laboratory course. Special instruction in ophthalmology should begin with such a course. It might be arranged in con-

nection with any graduate school of clinical medicine. But in fact a good course of the kind scarcely exists in America. Recently the best advice that could be given to a graduate student of large clinical experience, who wished to get a mastery of physiologic optics was that he should get Burch's *Practical Exercises in Physiological Optics*, and try to teach himself and a fellow student.

*Drawing* should have an important place in systematic training for ophthalmic practice. It may not be the only way, but it is an excellent way to get training in the accurate use of eye and hand that is greatly needed in ophthalmic work; and it is the only study usually given in an academic curriculum that does furnish this. It may be taken as preliminary to the study of medicine, in which case its value will be evident at all stages of the medical course. Or it is worth while to cultivate it on taking up the special study of ophthalmology. Not much can be expected in the way of teaching it in graduate medical schools. But the student who has had its value pointed out, can work at it alone, or can find help from professional draftsmen or artists.

#### THE COURSE IN OPHTHALMOLOGY.

The special training for ophthalmic practice needs to be greatly improved in these three directions: physiologic optics, anatomy, including the minute anatomy, and the pathology of the eye. When the training in these branches has been made more thorough the present facilities for clinical instruction will become more valuable and effective. Enough has already been said regarding physiologic optics in connection with preliminary training. But in the near future we will have to depend largely on graduate schools in ophthalmology to furnish it. They should take it up with the purpose of making it thorough, and of giving it before much time is given to clinical work.

The *anatomy* of the eye and of closely related parts need not claim much time in the graduate course. Some things about it are fairly well taught in the general medical course. The most se-

rious criticism of such teaching is that it does not go sufficiently into minutiae to meet the needs of special practice; and it does not deal sufficiently with the fresh or living eyeball. If anatomic material of the proper kind is close at hand, this instruction can be given in connection with operative or other clinical work. The essential thing is to emphasize the important anatomic facts, and not to allow them to be overlooked in the concentration of attention on operative or therapeutic procedures.

For the proper teaching of *ocular pathology* a course must largely be built up *de novo*. Not that good courses in pathology have not been offered from time to time in the past, for they have; but that they have not often been taken or given. For students trained as good medical schools now train their undergraduates in general pathology, the course in ocular pathology need not be a long one. Perhaps one month of well-planned, intensive training would be fairly effective. But it is a part of the course that needs to be carried out under the eye of a master. In few branches is the timely hint or the correction of faulty technic and inference so important. It is not merely a matter of learning to recognize certain tumors and pathogenic bacteria, it is to learn to see and appreciate all ordinary pathologic changes in all the ocular tissues. The course in ocular pathology will more and more be the test of the thoroughness of the teaching of ophthalmology in any special graduate school.

The *clinical work* is the part of the teaching of ophthalmology that is now best developed and can best be trusted to take care of itself in the immediate future. When it is sought by students well-prepared in the branches already alluded to, it will inevitably become more effective. But a little appreciation of the general principles of pedagogy would greatly improve it. Between the uninspiring narration or "pumping in" of facts, and the abandonment of the student to his own powers of observation and deduction, lies the whole realm of teaching. There

seems to be a very strong tendency to abandon real teaching for the easy routine on either side. It requires more exertion to find out what the student knows or understands, and connect this with what he needs to learn, than it does to prose forth the line of thought that passes through the teacher's mind; and it is still easier to bring the student before a patient and abandon him to his own devices. Perpetual stirring up is required to keep clinical teaching effective and thorough.

In this department of clinical work the most important portions are diagnosis, and the exact estimation of errors of refraction. The examinations of the American Board show that while every one who comes up has tried to gain some skill in these directions, the general lack of thoroughness and skilled guidance is painfully evident. Men of rather large clinical experience have fallen down woefully in regard to the recognition of intraocular conditions, or the exact estimation of refractive errors. One who has passed a full internship in an ophthalmic hospital may be quite ignorant of any systematic method of hunting down an error of refraction; and show lack of any instruction as to the systematic use of the ophthalmoscope.

Case histories have shown strikingly deficient training in their taking and recording even among those who have had years of clinic and hospital experience. In this respect ophthalmologists compare but poorly with the better trained of general surgeons. There are reasons for which the surgeon or the neurologist should be stimulated to keep complete records of his cases, that do not apply with equal force to the ophthalmologist. But making all due allowances, the deficiencies in the matter of case histories that have been brought to light by the experience of examiners in the American Board for Ophthalmic Examinations, are very serious. The attention of all teachers of ophthalmology should be called to them, and the need for better work in this direction emphasized.

The ophthalmic training of every student of medicine should include some



careful instruction with regard to case taking and case records. This should be made a center of organization for his knowledge of ophthalmic diagnosis, the branch of ophthalmology most important for the medical man who does not enter especially into ophthalmic practice.

#### REMEDIES.

The worst defects in present training for ophthalmic practice would be met if each university that has a medical department would establish short courses in physiologic optics, ocular anatomy, and ocular pathology, and would bring these to the notice of every medical student as courses to be taken before seeking the clinical part of training for ophthalmic practice. Even though the medical student manifests no immediate interest in them, he would think of them when his attention began to turn to ophthalmology as a specialty. If the whole medical profession understood the importance of such instruction, it could better judge the qualifications of the men who claim to be specialists in this direction.

Such courses should be established in connection with each graduate medical school that undertakes to teach ophthalmology; and the would-be student urged to devote the first weeks of his course chiefly or entirely to them. Every leader or teacher in ophthalmology has a duty to the profession and the public in this matter; and the announcement of the medical school can be made a most important instrument to bring about reform in this direction.

Those of us who are now engaged in ophthalmic practice are more or less conscious of our own deficiencies in regard to these studies fundamental to ophthalmology. It will be of great benefit to us individually as practitioners, to do something to remedy these deficiencies; and an open, concerted effort to do so will do more than any-

thing else to enforce the importance of fundamental training on those who intend to make themselves ophthalmologists.

An organization like this could arrange to give, just before its annual meeting, a week of intensive training on the microscopic diagnosis of intra-ocular tumors, under three or four of its members who have given special attention to ocular pathology. Or, to make the best use of the time with the least strain of any one set of powers, this might be combined with a similar course on experimental optics, or the minute anatomy of the eye with reference to operations on the anterior segment, or the location of foreign bodies. Such courses should be put on a basis of fees that would compensate the instructors, and provide the necessary material or equipment. Similar courses could be arranged by local ophthalmologic societies for the benefit of their own members, and to suit their convenience.

Finally, it would help to remove the greatest defects in training for ophthalmic practice, it would emphasize the importance of fundamental training, if the American Board of Ophthalmic Examinations would divide its examinations into two parts. It could give to students who have been out of the medical school one year or more, an examination on ocular anatomy, the physiology of vision, geometric, experimental, and physiologic optics, and ocular pathology. Two or more years later it could give the examination in ophthalmoscopy, and other branches of clinical diagnosis, clinical examination of patients, therapeutics, and operative technic. Something of this kind is needed to prevent the essential preliminary work from being neglected; and to prevent such neglect from impairing the value of all training in the so-called practical branches.



# THE COMPUTATION OF COMPENSATION FOR OCULAR INJURIES.

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A classification of such injuries for computing compensation with analysis of the various factors involved, and examples of methods to be pursued. Read before the Michigan State Medical Society, Battle Creek, Michigan, May 8th, 1918. Publication authorized by the Surgeon-General, U. S. Army.

The author requests that readers communicate to him their views upon this subject, in order that a compilation may be made embracing the views of American ophthalmologists, which may be presented as authoritative to the various legislative bodies.

Practically all laws dealing with compensation for injury to one or both eyes disregard partial loss of central or peripheral vision and have to do almost exclusively with the complete loss of light perception or the complete loss of the eyeball. Nor do any of the laws enacted by the various state legislatures take into account the loss of depth perception, so essential in many professions, while but few even mention disfigurement of the eyeball or its appendages. But a comprehensive survey of compensation due for injury to the eye, either directly or indirectly, must embrace these factors as well many others.

Compensation must be based upon the loss of ocular efficiency suffered by the injured and this naturally opens the subject into subdivision into ten main groups, based upon the type of injury sustained:

- I. Direct injury to one eye alone.
- II. Direct injury to both eyes.
- III. Direct injury to one eye alone, following which the second eye becomes affected by the visible inflammation known as sympathetic ophthalmia.
- IV. Direct injury to one eye alone where the other eye has a vision of less than 0.1 or is absent.
- V. Injury to the eyelids without involving the eyeball directly.
- VI. Injury to the extrinsic ocular muscles.
- VII. Injury to any part of the head, except the eye and its appendages, resulting in a disturbance of the visual field of one eye alone.
- VIII. Injury to any part of the

head, except the eye and its appendages, resulting in a disturbance of the visual field of both eyes.

IX. Injury to any part of the head, except the eye and its appendages, resulting in a central scotoma of one eye alone.

X. Injury to any part of the head, except the eye and its appendages, resulting in a central scotoma of both eyes.

It is not the purpose of this paper to discuss the actual amount of compensation due as a result of any injury, but rather to determine the percentage of a unit of compensation that may be due for any ocular injury. The laws of the majority of states have adopted 52 weeks' wages as the compensation due for the total loss of an eyeball, and throughout the remainder of this paper, that basis will be utilized as the unit of compensation, hereinafter graphically referred to as 100 C.

Before proceeding to a detailed discussion of the main groups, one other phase of the subject must be considered: a standardization of terms for the description of the value of vision. As normal or rather full vision, it is safe to adopt the empirical standard used the world over by ophthalmologists. That consists of a standard letter that subtends an angle of 5' on the retina. Such a measurement may be made at 10, 15, 20, 25, 30, or 40 feet, or at 5, 6, or 10 meters, and the results are usually expressed in fractions; the numerator being the distance at which the test is actually made and the denominator being the distance at which the letter should be seen by the normal

eye. Many ophthalmologists prefer to express this fraction in tenths, and for this paper such a nomenclature is to be preferred. In order to simplify the reduction of these fractions to the decimal notation, the following table is appended:

The left-hand column is the decimal notation of visual acuity.

	6 M.	10 M.	10 ft.	15 ft.	20 ft.	30 ft.	40 ft.
2.00	6/3	10/5	10/5	15/8	20/10	30/15	40/20
1.50				15/10		30/20	
1.00	6/6	10/10	10/10	15/15	20/20	30/30	40/40
0.90							
0.88							40/45
0.83		10/12	10/12				
0.80					20/25		40/50
0.75	6/8			15/20		30/40	
0.70							
0.66	6/9	10/15	10/15		20/30		40/60
0.60	6/10			15/25		30/50	
0.55		10/18	10/18				40/70
0.50	6/12	10/20	10/20	15/30	20/40	30/60	40/80
0.42						30/70	
0.40	6/15	10/25	10/25		20/50		40/100
0.37				15/40			
0.33	6/18	10/30	10/30		20/60	30/90	
0.30				15/50		30/100	
0.29					20/70		
0.25	6/24	10/40	10/40	15/60	20/80		
0.22					20/90		
0.20	6/30	10/50	10/50	15/75	20/100		40/200
0.16	6/36						
0.15						30/200	
0.10	6/60	10/100	10/100	15/150	20/200	30/300	40/400

It is realized that a vision of 20/40 or 0.5, although theoretically only one-half of full vision, represents far more than merely half vision to an injured eye. But it is absolutely impossible to estimate accurately just how useful that degree or any reduced degree of vision is, and consequently it becomes necessary to adhere to the more or less theoretical tables until a very low degree of vision is reached. For all practical purposes it may be assumed that vision of 0.1 or less is equivalent to no vision, and entitles a man to compensation upon that basis. To endeavor to differentiate between absolute loss of sight (amaurosis) and loss of sight to such extent that only non-useful vision remains, is unnecessary from a practical standpoint. Again, the loss of an eyeball entitles the injured to greater compensation than merely complete loss of vision and this table so provides.

#### *I. Direct Injury to One Eye Alone.*

Under this heading come the cases of direct injury to one eye alone, whereby the vision of that eye only is reduced. Time forms a factor in the estimation of compensation, and as this

factor is so variable it becomes necessary to establish a definite time when the examination upon which the compensation is to be based shall be made. From an empirical standpoint, it seems best to insist that at least two months elapse between the time when the last trace of visible inflammation has disappeared from the eye involved and the time of examination.

This factor having been fixed, there remain four variable factors that have to be taken into consideration:

A. The vision of the injured eye. This must be computed in tenths according to the table previously given. The amount of vision to be used as this factor is the best possible vision to be obtained with or without the aid of correcting glasses, provided that the strength of the spherical lens required to obtain the best vision be not more than four diopters different from the spherical lens required to obtain the best possible vision in the other eye. Should a difference of more than four diopters exist between the spherical refraction of the two eyes, the uncorrected vision of the injured eye is to be used. Should a vision of less than 0.1 exist, such vision shall count as 0. The value of this factor is to be 100 or fraction thereof. (Example: vision of 0.6 shall count as 60, vision of 0.4 as 40, etc.)

B. The vision of the uninjured eye. This is to be computed on the basis of 100 or fraction thereof as in the case of the injured eye and the best possible vision, either with or without correcting glasses, irrespective of the strength of such glass, is to be utilized. The vision recorded is to be that determined at the time of the examination upon which the compensation is based, regardless of the visual results of any previous examination. (Example: full vision or vision 1.0 shall count as 100; vision of 0.6 shall count as 60, etc.)

C. The ability to recognize depth at arm's length or less (the estimation of the third dimension). This is essentially a function of two seeing eyes, but may exist in the presence of a marked difference in the visual capability of the two eyes. As a rule, if

there be a difference of more than 0.7 between the vision of the two eyes, true depth perception is lacking, but may be replaced by monocular pseudo-depth perception. This faculty, however, usually requires at least a year for its full development. The simplest method of estimating depth-perception is by the Hering drop test, which instrument should be in the possession of the Board of Compensation. At least ten tests should be made with this instrument to determine the presence or absence of this function and upon the results of these tests, the percentage of depth perception may be estimated. Depth perception may be rated as 100, if undisturbed, or any fraction thereof shown by the tests, or as 0 if entirely absent.

D. Cosmetic result. The effect of the result of a disfiguring injury upon the individual cannot be neglected. Disfigurements of the eyelids or eyeballs entitle the injured to a greater compensation than mere injury to vision alone. But under this sub-heading come only the cases of disfigurement of the eyelids or eyeballs when accompanied by a loss of vision dependent directly upon the injury. Mere disfigurement alone resulting from injury without damage to the vision is classed under main Types V and VI.

The value of this factor is to be 50 or fraction thereof, determined by the Board upon the degree of disfigurement present at least two months after the original injury has occurred.

In compiling these four factors into an adjudgment of compensation for injury to one eye alone, the injured ball shall be placed in one of two classes:

(a) Individuals whose employment is of a character that ability to estimate depth at arm's length or less is essential.

(b) Individuals whose employment is of a character that ability to estimate depth at arm's length or less is not essential.

In class (a), the vision of the injured eye, plus the vision of the uninjured eye, plus the percentage of depth perception, plus the figure determined by the Board as the percentage of dis-

figurement; all divided by 3.5 shall represent the ocular efficiency of the injured. This figure subtracted from the full compensation of 100 represents the percentage of compensation to which the injured is entitled.

For example, a machinist is injured in one eye with a resultant vision of 0.4; the vision of the uninjured eye is normal or 1.0. He is able to perceive depth only twice out of ten attempts, which determines the value of this factor as 20; no external scars are visible; then

Factor A = 40  
Factor B = 100  
Factor C = 20  
Factor D = 50

—  
210 divided by 3.5 = 60%  
ocular efficiency.

Compensation 100  
Efficiency 60

—  
40% Compensation  
that the injured  
is entitled to.

In class (b), the method of procedure is identical, with the exception that factor C is eliminated, for in this class of individuals, depth perception is not essential to their efficiency. The final result is obtained by the addition of A, the vision of the injured eye, and B, the vision of the uninjured eye; and D, the cosmetic result, all divided by 2.5 and this figure subtracted from 100.

For example, a trench digger is injured in one eye with a resultant vision of 0.4; the vision of the uninjured eye is normal, no external scars are to be seen; then

Factor A = 40  
Factor B = 100  
Factor D = 50

—  
190 divided by 2.5 = 76%  
ocular efficiency.

Compensation 100  
Efficiency 76

—  
24% Compensation  
that the injured  
is entitled to.



## II. Impairment of Both the Eyes.

The four factors that are considered under heading I enter into the discussion of this type of injury and they must be computed in the same manner as before, with but one difference. Total compensation, percentages of which are calculated, must be three times that estimated for one eye alone, as deprivation of sight is of greater consequence when involving both eyes. The factor of depth perception must be calculated exactly as in class (a), heading I.

For example, a man suffers an injury involving both eyes, with a resultant vision of 0.4 in one eye and 0.6 in the other. He has lost 50% of his ability to judge depth and the resultant corneal maculae have a disfiguring value of one half or 25; then

Factor A = 40

Factor B = 60

Factor C = 50

Factor D = 25

175 divided by 3.5 = 50%  
ocular efficiency.

Compensation 100%

Efficiency 50%

50% Compensation,

which in this case represents 150 C., as the compensation has been trebled for this type of cases.

III. Direct injury to one eye alone, whereby the second eye becomes affected with the visible inflammation known as sympathetic ophthalmia. The discussion of this type of compensation is necessarily based upon the time element. Under heading I, it was stated empirically that two months should elapse between the time that the last visible trace of inflammation had disappeared from the injured eye, and the examination upon which the compensation was to be based. Sympathetic ophthalmia may appear at any time following an injury, but over 80% of the cases develop within thirty-five days. Consequently if two months have elapsed after the subsidence of visible inflammation without involvement of the second eye, it is fairly safe to assume that the greatest danger is

past and that another trauma is necessary to arouse the sympathizing inflammation. If a sympathetic ophthalmia does appear within the time limit herein stated, at least twelve months and not more than sixteen months must elapse before compensation may be determined. It should then be established on the same basis as under heading II.

IV. Direct injury to one eye where the other eye is absent or has a vision of one-tenth or less.

The gravity of an injury to an eye under this heading is great, and the compensation can be governed by one factor only, viz., the ultimate vision. The more this is damaged, the greater must be the compensation, but no arithmetical or geometrical progression can establish the proper amount. Table II shows the compensation due, based upon ultimate vision:

Ultimate Vision	Compensation Due
0.9 .....	15%
0.8 .....	30%
0.7 .....	50%
0.6 .....	75%
0.5 .....	100%
0.4 .....	200%
0.3 .....	300%
0.2 .....	400%
0.1 or less.....	500%

V. Injury to the eyelids alone, not involving the eyeball or ocular muscles.

Injury to the eyelids alone, not involving the eyeball or ocular muscles, is so rare and may be so varied in character that no hard and fast computation of compensation is possible. The factors that must be taken into consideration are:

(1) Injury of such a character that the eyeball eventually suffers by exposure. (Lagophthalmos.)

(2) Injury of such a character that the distortion of the lids eventuates in resultant damage to the eyeball. (Entropion.)

(3) Injury of such a character that there results a constant overflow of tears. (Ectropion with epiphora.)

(4) Cosmetically disfiguring injury.

The estimation of compensation should be withheld until three months

after the injury has occurred, and then must be determined by the board for each case. In no case shall the compensation be greater than 100 C.

#### INJURIES OUTSIDE THE EYEBALL.

#### VI. Injury to the extrinsic ocular muscles.

This may be in the nature of a direct trauma to one or more muscles themselves or to the controlling nerves. Time is one of the principal elements that must be reckoned with in the consideration of this type of injury and no compensation may be estimated until at least four months have elapsed subsequent to the injury and not more than eight months. If an operation is deemed advisable by the physicians in attendance to reattach a severed muscle, or to shorten a relaxed muscle, or to improve the muscular condition in any way possible, it should be performed within the time limits stated. As vision is not a factor of this type of injury, all cases may be placed in one of two classes:

- (a) Those with a resultant horizontal diplopia and
- (b) Those with a resultant vertical diplopia.

The first of these two classes is the least serious, and as such is entitled to less compensation than the latter, the amount of diplopia does not enter into consideration, for a minor degree is as serious as a high degree as regards visual capability of the individual. Inasmuch as the subjective phase of diplopia eventually disappears with the education of one eye in the suppression of its image, the injured cannot claim full compensation for complete loss of vision of one eye. With these points in mind, 40% C is adequate compensation for class (a), and 60% C for class (b).

#### VII. Injury to any part of the head, except the eye and its appendages, resulting in a disturbance of the visual field of one eye alone.

In this class of cases, a double compensation must be considered; that for the injury to the head, and that for the injury to the visual function. The latter class alone is considered in this paper,

and the compensations herein determined are in addition to whatever the board may fix for the primary head injury. The time element is the same as that considered under heading I.

(a) Vision normal: nasal half of one visual field deficient even as far as the 10° meridian. *No compensation* because there is no visual loss, the field defect being taken care of by the temporal half of the opposite field.

(b) Vision reduced: nasal half of one visual field deficient even as far as the 10° meridian. Compensation based upon the calculations provided for under heading I.

(c) Vision normal: temporal half of field missing even as far as the 10° meridian. According to Maschke, this reduces the visual capability of an eye about 1/6 and entitles the injured to 10% compensation.

(d) Vision reduced: temporal half of field missing even as far as the 10° meridian. The compensation for the reduction of vision is to be calculated under the formulae given in heading I, to which is to be added 10% C for the visual field contraction.

(e) Vision normal: concentric contraction of the visual field of one eye. The ocular efficiency of an eye is not greatly impaired by this type of injury until the contraction is of such a high degree that the resultant vision is practically tubular in character. The following table shows the amount of compensation due for

Concentric contraction of one visual field to	
60° = C	0
40° = C	5%
20° = C	15%
10° = C	30%
5° = C	75%

(f) Vision reduced: concentric contraction of the visual field of one eye. For the reduced vision, the compensation must be calculated as under heading I, to which is added the compensation due for concentric contraction of the visual field of one eye alone as shown in the above table. (Heading VII-c.)

VIII. Injury to any part of the head, except the eye and its appendages, resulting in a disturbance of the visual fields of both eyes.

Four types of cases must be considered under this heading:

(a) Vision normal: more or less concentric contraction of both visual fields. The following table gives the compensation due for such injuries.

Concentric Contraction to	60°=C	5%
"	"	" 40°=C 10%
"	"	" 20°=C 25%
"	"	" 10°=C 60%
"	"	" 5°=C 150%

(b) Vision reduced: more or less concentric contraction of both visual fields. A double calculation is here necessary; the first for the reduction of vision based upon heading I, and the second upon the field contraction as per the above table. (Heading VIII-a.)

(c) Vision normal: homonymous hemianopsia.

(1) If the visual field defect does not approach nearer to the center of the field than 17°, the visual capability of the man is not reduced more than 10% and that is the compensation such an injured person is entitled to.

(2) If the homonymous field defect encroaches beyond the 17° meridian, but still insufficiently to affect macular vision, thus throwing the case under heading (1), the compensation must be based upon the type of defect, a table of which follows:

Left-sided homonymous hemianopsia	= C 50%
Right-sided homonymous hemianopsia	= C 150%
Superior homonymous hemianopsia	= C 50%
Inferior homonymous hemianopsia	= C 100%

(d) Vision reduced: homonymous hemianopsia.

(1) If the hemianopsia does not become more central than 17°, compensation must be estimated upon the reduction of vision as calculated under heading (1), plus 10%.

(2) If the hemianopsia intrudes within the 17° meridian, the compensation must be the result of the calculation based on heading (1), plus the compensation shown above under heading VIII, class (c), subhead (2).

(e) Vision normal: bitemporal hemianopsia.

The visual efficiency is but slightly reduced in this class of cases and the injured is entitled to but 15% compensation.

(f) Vision reduced: bitemporal hemianopsia.

To the calculation for the reduced vision as estimated under heading (1), must be added 15% for the visual field defect.

(g) Vision normal: binasal hemianopsia.

The visual capability suffers somewhat more in this type of injury and entitles the injured to 25% compensation.

(h) Vision reduced: binasal hemianopsia.

Add to the compensation estimated under heading I for the reduced vision, 25% for the visual field defect.

IX. Injury to any part of the head except the eye and its appendages, resulting in a central scotoma of one eye alone.

The visual damage to an eye under this heading must be estimated directly by the size of the resultant scotoma. The following shows the percentage compensation due for unilateral central scotoma of

Less than 3° = C 40%

3°- 5° = C 60%

5°-10° = C 75%

More than 10° = C 90%

X. Injury to any part of the head except the eyes and their appendages resulting in central scotomata of both eyes.

Central scotomata of both eyes present a far more serious problem than the previous and one that entitles the injured to a higher rate of compensation. In practically all cases, the scotomata of retrobulbar origin (such as are included in this heading) are equal and symmetric, and hence the following applies for both eyes:

Central scotomata of less than 3° = C 75%

" " " 3°- 5° = C 100%

" " " 5°-10° = C 150%

" " " more than 10° = C 200%



## AN ETIOLOGICAL FACTOR IN TRACHOMA.

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This paper suggests a possible carrier or intermediary host concerned in the transmission of trachoma. It brings together certain facts regarding this disease that would be explained if the hypothesis accepted. It suggests possibilities in etiology.

In the "Annales d'Oculistique," September, 1917, Dr. J. Santos Fernandez, oculist in Cuba, published an article entitled, "Is Trachoma Curable?" in which he draws the conclusion that true trachoma, having its origin in misery and uncleanness, once developed, is never cured, and that the diagnosis is not lightly made before its evolution. "Let it be as it may," the author says, "it is well known that trachoma is a disease of the poorer classes and it would spontaneously disappear, therefore, if the government would take care of the poor sick."

A long time ago even doctors thought that yellow fever would never disappear from the places where it once developed. In recent years, however, by avoiding the mosquito bite, the disease has been finally eradicated from most places, and at present the Rockefeller Foundation supports a commission whose duty is to extinguish it wherever it may be found. Hygiene, therefore, has gained an important victory over this enemy. The same, we hope, will take place as regards trachoma, because it is far better to prevent the disease than to have to deal with it.

Trachoma in Cuba was introduced by immigration, and notwithstanding rigorous measures taken by the health department in the harbors, the disease spread all over the country.

Here is a matter difficult to explain: the inefficacy of those measures of prevention in countries free from trachoma. It is very difficult also to understand why trachoma is a disease of the poorer classes, who live in bad hygienic conditions.

The specific germ of trachoma is unknown, as likewise is the way contagion can take place. There are some localities where trachoma abundantly prevails without the reason being known; there are other places, such as high altitudes, where very seldom the disease is to be found. Another thing, sometimes in one family we see all but one or two affected, and these never get it.

Admitting that trachoma is inoculated by the body louse a great many questions hitherto unexplained would be answered at once. This is the possibility that we wish to state and justify in the present article.

*Pediculus vestimenti* is today considered one of the carriers of typhus germs. (See "The Louse Problem," by Horace C. Hall, New York Medical Journal, no. 9, June, 1917, p. 1071.) Nicolle proved in France that typhus fever could be transmitted from monkey to monkey by the body louse; Wilder proved that the disease is transmitted from man to monkey by the same medium. Olitsky, Denzer, and Husk published conclusive evidence concerning the body louse as an etiological factor in typhus fever.

Recent revelations prove that elimination of vermin of genus *pediculidae*, known in Brazil as "piochos," should be regarded as more important than quarantine measures. The vermin belong to the class of hemipteres parasites, *pediculina* or *pediculidae*, without wings. They have a suction apparatus by which they cling to the human skin, and animals, aided by small hooks. The general form is elliptical, the larger part of the body consisting in a large

abdomen. The external coat is so hard that when the pediculus is mashed we hear a noise.

They are oviparous and extremely prolific. Their eggs, which mature rapidly, are found attached to the hair and are known as nits (*lendeas*, in Brazil). There are three species found on man: (1) the *pediculus capitis*, so named because it is most frequently found in the hair of the head, is the slenderest of the three; (2) the *pediculus vestimenti*, or body louse, so named because it is most frequently found in the hair of the body and in the folds of the clothing. This latter is less transparent, having a grayish color. Thousands of these vermin are found where uncleanness prevails, in the homes of poverty and misery. If we can prove that this is the carrier of trachoma, we can understand why trachoma prevails in unhygienic conditions. (3) The last kind is the *phthirus pubis* or *inguinalis*, so named because it is most frequently found in the hair of the pubic and perineal region; but it may be found also all over the body.

*Pediculus capitis* rarely strays from beneath the hair of the head. It feeds upon human blood and may cause eczema, impetigo, and superficial suppuration. The oiliness of the hair is not favorable to the increase of the vermin. It is a known, but inexplicable, fact, mentioned by Horace Hall, that the head louse will not infest the hair of some persons, even after they have been placed on the scalp, as a matter of test.

Should we be conclusively convinced that one of these kinds of vermin is the carrier of trachoma, there will be explained the fact that some persons of one family are not affected. Some persons are unable to rid themselves of the vermin until after the hair is closely clipped. Horace Hall found head lice and crab lice on the same individual, but has never discovered an individual with both body and crab lice.

*Pediculus vestimenti* lives and deposits its eggs within the folds of the clothing, and is named body louse probably for the reason that rarely is it found on the extremities or on the head. It is a night feeder and difficult

to discover within the folds of the garments, other than those in contact with the skin. It will not deposit its eggs on silk clothing or on clothing moistened with perspiration. It is more prolific than the head louse. Due undoubtedly to certain odorous secretions of the skin, certain individuals repel the vermin.

In a family of lousy people, certain individuals will be found free from vermin—a curious fact that would explain, upon the hypothesis of the vermin's being the carrier of trachoma, the cases thought to be due to immunity, of individuals free from trachoma in places where this disease is particularly common. The maturity of the eggs depends upon the feeding, by the female, on human blood.

The elimination of this louse, in the opinion of Horace Hall, means the elimination of typhus fever. All immigrants in a proportion of 80% have eggs and live lice in their clothing and in their baggage.

Immigrants from Mexico can no longer enter the United States without previously getting rid of the louse and its eggs, because certain districts of Mexico are known to be infested with the body louse. The cars and baggage of the immigrants are fumigated with hydrocyanic acid gas. As regards trachoma, we could explain thus the fact that certain localities are free, being free from these vermin carriers.

Here is the possibility that I address to our institutes with the view of having fully discussed the question in which we are so much interested, that of prophylaxis of trachoma. With a desire to be useful to our unfortunate countrymen affected with trachoma we dare to write these lines.

I remember that a well known hygienist of S. Paulo, Brazil, Dr. Guilherme Alvaro, I believe, thought to find in the "powder mosquito" (*mosquito polvora*, in Brazil) the carrier of trachoma. This hypothesis would not explain, as ours of the body louse, most of the facts I mention. The "*mosquito polvora*" is not found in many localities infested with trachoma, while the body louse is generally found where

there are persons crowded in one place, living in poor hygienic conditions, and is frequently found in places where trachoma prevails.

If finally proven that the vermin is really the trachoma carrier, the elimination of the disease will soon be an established fact, because the eradication of the vermin is an easy task for the hygienist. Pupils in schools very frequently get trachoma and we know that schools are great distributing points for lice. Trachoma is a destructive inflammation of the conjunctiva with ultimate formation of scar tissue, intractable to all local treatment.

The diagnosis of trachoma, says M. H. Foster (Journal A. M. A., Dec. 1, 1917), is not as easy as some would pretend, for several other conjunctival inflammations may produce granulations closely resembling those of trachoma. While the granulations are very characteristic they may be imitated closely by other diseases of the eye. The one *absolutely characteristic feature of trachoma* is the formation of scar tissue and its *typical distribution*.

The examination should be made by everting the upper lid over a bent loop glove buttoner, which is the best instrument for the purpose (Foster).

When pressure is made by this instrument the normal conjunctiva shows a white area, which shades impercep-

tibly into the normal pink of the surrounding area.

In trachoma the characteristic feature under such conditions is that with the proper pressure uneven, irregular, blotchy patches of white appear, representing scar tissue. Between these areas the conjunctiva remains red.

The influence of seasons of the year in the development of trachoma is a well known fact. Any acute ophthalmia will greatly aid the spread of trachoma. Acute ophthalmias seem due to direct infection from the finger or towel. Flies probably have little to do with their spread. Dust containing infective material is a very fruitful source of infection in acute ophthalmias, especially among the lower classes, who all herd together and very frequently with their animals. Colonel Elliot said that trachoma is largely spread in India by the use of antimony paste, a cosmetic widely used by the more well-to-do classes. One must be on the lookout for mixed infections.

The treatment of trachoma is unsatisfactory at best. Should a bacterial origin be established for trachoma, treatment by vaccines will offer considerable promise of success. By true trachoma I mean that about whose diagnosis there is no doubt. The best treatment known today for true trachoma is, undoubtedly, the excision of the trachoma tissue.

## NOTES, CASES AND INSTRUMENTS

In this department will be published brief reports of cases, descriptions of new instruments, and notes or suggestions of interest to workers on ophthalmology.

### THE FREQUENCY OF CILIOPRETINAL ARTERIES OCCURRING IN THREE THOUSAND FIVE HUNDRED AND FIFTY-FOUR EYES EXAMINED CONSECUTIVELY.

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The short posterior ciliary arteries after entering the sclera give off branches

which form an arterial ring (Zinn's Circle), which surrounds the foramen for the optic nerve. Numerous small branches go from this circle to the optic nerve and its sheath, and anastomose with branches of the central artery of the nerve. It not infrequently happens that the individual branches arising from the scleral ring of Zinn, instead of remaining in the optic nerve, make a bend leave the nerve and enter the retina.



As usually described, they run toward the macula and supply with blood a small region of the retina lying between the papilla and the macula. These vessels are called cilioretinal arteries. It is by the appearance of the characteristic bend that they are to be differentiated from branches of the central artery, which come off posterior to the disc surface and appear as distinct from the central artery. According to Parsons, cilioretinal arteries were first discovered by Donders and H. Müller, and demonstrated anatomically by Nettleship.

Other regions than that between papilla and macula may be supplied with blood from cilioretinal arteries. They may replace one of the principal branches of the central artery, and rarely more than one may be present in the same eye. They are terminal arteries as shown by cases of embolism of the central artery. In such cases the portion of the retina supplied by these branches will continue

to function after the lumen of the central artery is completely closed.

Cilioretinal veins are much rarer than the arteries, due to the fact, according to Leber, that there are no veins in the circle of Zinn. When observed, they are probably of new formation following inflammation (Parsons).

The presence of cilioretinal arteries has been reported in from 7 to 16 per cent of the cases examined. With a view of checking the impression that this anomaly occurred more frequently than was generally reported, it was determined to record their presence or absence in a number of consecutive cases, and tabulate the results obtained.

A series of 3,554 eyes was examined without a break in the continuity of cases. Of this number, 1,235, or 34.75 per cent, showed, as classified from clinical observation alone, the presence of a cilioretinal artery in one of the various locations as shown in the following table:

TABLE SHOWING THE TOTAL NUMBER AND PERCENTAGE OF CILIORETINAL ARTERIES TOGETHER WITH THEIR DISTRIBUTION, FOUND IN 3,554 CONSECUTIVE EXAMINATIONS.

Cilioretinal arteries—	O. D.		O. S.		Total	
	No.	%	No.	%	No.	%
Temporal—Sup. and Inf. ....	341	19.1	379	21.3	720	20.2
Macular .....	223	12.5	247	13.3	470	13.2
Nasal .....	27	1.5	18	1.01	45	1.2
Total .....	591	13.8	644	18.4	1,235	34.75
Both Temp. and Nasal.....	7	0.39	4	0.22	11	.3
More than one .....	49	2.1	54	2.9	103	2.6
Replacing Inf. Temp. ....	1	...	2	...	3	...
Replacing Sup. Temp. ....	0	...	1	N4	1	...

It will be noted, from the table that the course of the cilioretinal arteries was in the superior and inferior temporal region more often than in the macula region, being 20.2 per cent in the former and 13.2 per cent in the latter. In forty-five instances the artery took a nasal course either in the superior or inferior quadrant = 1.2 per cent.

There were more than one such vessel in one hundred and three cases, 2.6 per cent. The inferior temporal artery was displaced by a cilio-retinal in three eyes and the superior temporal in one eye.

## TO PREVENT THE TURNING OF ROUND LENSES.

DAVID W. WELLS, M. D., F. A. C. S.

BOSTON.

The popularity of round lenses, and the adoption of the new military frame, have emphasized the importance of maintaining the lens in its desired position. Shell and celluloid were the material first to come into general use, shell for the few and celluloid for the many. Since the lens must be "snapped" into these

frames, without opening the joint, it was soon found that unless great care were exercised in securing a perfect fit such lenses were likely to get turned from their original positions. The opticians early discovered this and adopted the plan of scratching each end of the horizontal diameter, expecting that the patient would notice if these marks were out of place. But as the marks are not very conspicuous, and as the importance of frequent examination is not sufficiently emphasized, patients frequently wear their cylinders at wrong axes, not discovering the error until symptoms of eye strain have appeared.

it. This is not entirely satisfactory, as it is likely to discolor the frame and except in the hands of an expert looks a little "botchy." When the "Liberty Frame" appeared the writer took the matter up with the American Optical Company, but they had nothing better to suggest than the drop of solder.

Major Greenwood was consulted and in his paper prepared for the Ophthalmic Section of the American Medical Association advises the drop of solder "if the lens seems loose." In a second communication to the American Optical Company it was suggested that if the arm of the bridge were made to straddle the eye

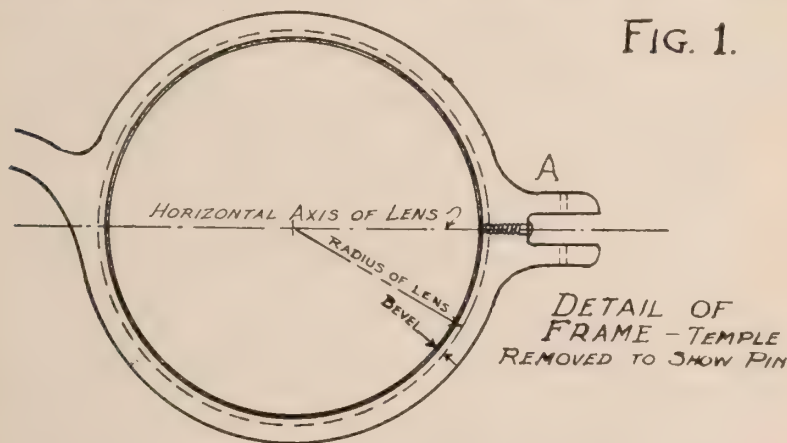


FIG. 1.

Some years ago the writer, after consulting with a Boston optician, Langton, adopted the plan of taking out the temples and tapping a small screw through the frame, the point of the screw projecting into the groove into which fits the glass. A notch filed in the lens at the corresponding point absolutely secures the position. If the lens happens to come out it cannot be replaced wrong without danger of chipping the glass.

Unfortunately the shell frame is often so frail that tapping in a screw is liable to break it. The writer feels that the ability to secure the lens is of paramount importance, and therefore advises against shell, although the opticians naturally try to push these. The all metal round frame is more difficult to manage. We have overcome the difficulty by melting a bit of soft solder into the hollow wire at the bridge end, and filing the notch for

wire, the groove would be filled up at that point, and necessitate filing a notch in the lens. Incidentally, this would strengthen the frame at its weakest point. The arm of the bridge could be brazed to the *inside* of the eye-wire. They reply that "it is not a very practical manufacturing proposition," and again recommend the drop of solder "when absolutely required."

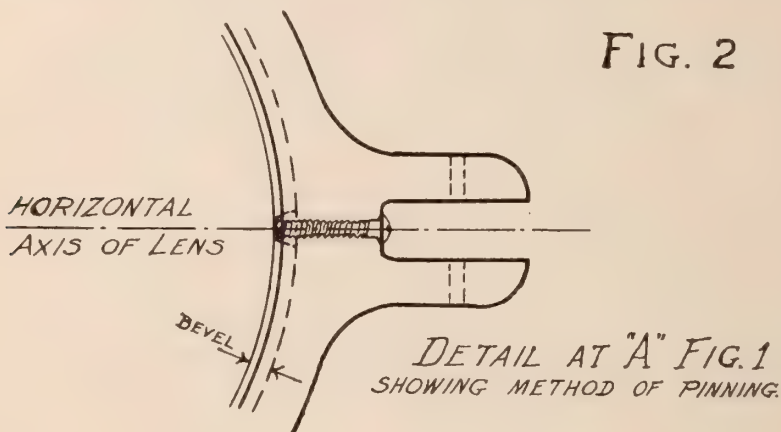
The concealed wire in celluloid puts the Windsor frame in the same class with the all metal, except that the drop of solder cannot here be used. Here, again, the arm of the bridge could be extended to supply the projection. The writer does not presume to decide the "most practical manufacturing proposition," but it would undoubtedly be forthcoming if there were any general demand for it.

If it is important to discover the exact axis of a correcting cylinder, it is cer-

tainly stupid to allow it to be dispensed so that there is any possibility of its getting wrong. The same importance attaches to sphericals if they happen to be decentered. To leave it to the optician to decide when the pinning or the drop of solder is necessary will never eliminate the trouble. The remedy must be applied in every case, and all that is necessary is for ophthalmologists to demand it.

microbes or toxins of influenza. Macnamara reported cases which had regained perfect vision under mercurial treatment, while Weeks was pessimistic as regards treatment.

My second case ought not perhaps to be included as a sequel of gripe (J. A. M. A., July 1, 1916, p. 34). It was a case of sudden blindness coming on three weeks before I saw the woman, who was



My dear colleague, if you agree with me in regard to the importance of this reform, will you please say so at once to the American Optical Company, Southbridge, Mass., as I believe that a few hundred requests from the ophthalmologists of the country would be an irresistible argument.

#### RETROBULBAR NEURITIS FOLLOWING INFLUENZA.

EDWARD J. BROWN, M. D.

MINNEAPOLIS.

In 1893, when I reported my first case of optic neuritis, the result of influenza (Oph. Record, Vol. II, p. 441), I had no suspicion that the lesion was connected with pressure from a diseased nasal sinus. That others were equally in the dark is shown by reports by Macnamara of London, British Med. Jour., Aug. 1, 1891, Weeks of New York, N. Y. Med. Jour., Aug. 8, 1891, and Gifford of Omaha, Oph. Rec., Vol. II, p. 442, all of whom apparently believed as I did that the neuritis was caused directly by the

incapable of giving a definite history. She had, however, had severe pain in the head and back and had been seen by several specialists, including those of the University dispensary, without any one suspecting that the markedly swollen disc and retina had any relation to nasal sinus disease. When, five years later, she was prevailed upon to have the greatly enlarged middle turbinal and the diseased ethmoid cells removed, there was immediate improvement of the vision.

I have lately had a case in which the history and results of treatment are equally clear. S. H. M., 30, has been under observation for some years. The right eye is normal with vision 20/15 except that the temporal disc is concave, and the color fields contracted, as is also that of the left. The left eye was splashed with embalming fluid when the patient was sixteen; but can hardly have had as much permanent damage from the accident as the family believe. V. O. S. when first seen was 8/200, under scopolamin + 4  $\odot$  + 2.50 cyl. axis 75° = 20/70. On April 8th of this year he reported that he had been ill with gripe for a week,



and that his vision had been bad for three or four days. There was moderate paresis of the accommodation of both eyes. With his glasses V. O. D. 20/20 +, but smoky. V. O. S. 9/200 and not improved. Ophthalmoscopic examination was negative. There was a paracentral scotoma for colors wholly temporal, with a radius of two and a half degrees. The ethmoids were dark to transillumination and there was some increase of the nasal discharge, with swelling of the turbinals.

After washing out the nose with an alkaline solution and passing a current of hot air through the nares for fifteen minutes, there was a marked improvement with V. O. S. 20/200. Negative pressure followed with hot calomel vapors was also used, and this treatment was given daily. On the 10th I removed the crowded middle turbinal of the left side; and some days later, as the improvement was slow, exenterated the ethmoids by biting through the uncinate process with alligator forceps, and then making successive bites with the instrument held in different positions till the hard wall of the sphenoid was reached. This operation has appealed to me for many years as easier and safer than the use of curets. The patient was also given a 50 per cent calomel ointment for inunction.

On the 23d the color scotoma had disappeared, but vision still remained 20/200. He came in every day with the announcement that vision was clearer, and on the 30th of April he could read 20/70 or as well as before his illness.

## PARINAUD'S CONJUNCTIVITIS, WITH REPORT OF A CASE.

T. E. FULLER, M. D., F. A. C. S.

TEXARKANA, ARK.-TEXAS.

Since 1889, when Parinaud first described this form of conjunctivitis, a number of cases have been reported. Prominent among the investigators of the disease in this country are Gifford, Derby and Verhoeff. Parinaud believed the disease to be one of animal origin. One of his cases was a butcher, another resided next to the butcher shop and a third lived in a house where meat was stored. Hoor believes there has been an opportunity

for animal contagion in most of the cases. Kirkendall reports a case in a farmer who had treated his horses and cows for a distemper associated with pink eye. Many observers, including Verhoeff and Derby, believe the claim of animal contagion to be unsubstantiated.

Xerosis bacilli, alone or in conjunction with other germs, are believed by some to be the cause of the disease; others regard it as an attenuated form of tuberculosis of the conjunctiva, but the tissue examinations have failed to reveal the characteristics of the anatomic tubercle. In the few cases where animal inoculation was positive, no doubt a case of tuberculosis of the conjunctiva had been mistaken for Parinaud's conjunctivitis.

Some believe that the condition under consideration is not a disease at all, but a symptom complex. Verhoeff has examined a series of 12 cases, which he has studied histologically. He describes the lesions very minutely and disproves the assertion that there is nothing characteristic in the histology of Parinaud's conjunctivitis. He has also succeeded in isolating a hitherto undescribed organism, which he classes as a leptothrix. He regards this as the etiologic factor, and produces the evidence to prove that Parinaud's conjunctivitis is a distinct entity. The disease occurs only in the temperate zone and is most common in autumn. Both sexes are susceptible and all ages liable. It is most always unilateral.

The onset is acute with constitutional symptoms, such as fever, malaise, etc. The preauricular, parotid and sometimes the cervical glands are swollen and tender and not infrequently suppurate. Occasionally the disease is accompanied by acute tonsillitis. In the inflamed conjunctiva, reddish or yellowish granulations develop. These may grow so large as to produce considerable swelling. In some cases superficial ulcers form on these granulations. With the greatly swollen lids and constitutional symptoms the disease presents a very formidable appearance, but the outcome is uniformly good. The course varies from a few weeks to a few months, but recovery without injury to vision is the rule.

The diseases most likely to be confused with Parinaud's conjunctivitis are squir-

rel plague ophthalmia, sporotrichosis and tuberculosis of the conjunctiva; and possibly in some cases trachoma. The use of the microscope, tuberculin tests, and, if necessary, animal inoculation will establish the nature of the condition. The course of the disease is not very greatly influenced by treatment; silver nitrat or the newer silver salts may be used. Excision of the granulations is highly recommended; frequent bathing of the eyes with boric acid or other antiseptic solution should be practiced. Sinclair and Sherman used a vaccine in one case, but the patient did not remain under observation long enough for a definite conclusion to be reached.

#### REPORT OF A CASE.

The patient was a male, age 36, laborer at a saw mill, with nothing of interest in his family history. His health had been good previous to the beginning of the present trouble. This began some two or three weeks before when he caught what is commonly called a dog tick, and squeezed it between his fingers. The contents of the tick's body flew into his right eye. This began at once to inflame and in 24 hours his lids were greatly swollen. He was suffering considerable pain, and his temperature was 104.5°. The glands of the face and neck were enlarged and tender. His constitutional symptoms subsided in a few days, but there was little improvement in the condition of his eye.

At the time of the examination his preauricular gland, his parotid and all of the

cervical glands of the anterior group were enlarged and very tender, the skin over them being red and glossy. There was no fluctuation. The right upper lid was swollen and edematous, there was no involvement of the lacrimal gland. The upper palpebral conjunctiva was covered with large irregular nodules, on the summit of many of these superficial ulcers were to be seen. The conjunctiva of the globe and lower lid was injected, but showed nothing characteristic. There was a moderate mucopurulent discharge, the cornea was transparent, a smear taken at this time showed only some xerosis bacilli and a few cocci.

The case was diagnosed as one of Parinaud's conjunctivitis, and the patient was sent to the hospital, put on a generous diet and a boric acid bath and yellow oxid ointment prescribed. Under this treatment he improved slowly but steadily. He was allowed to return home before his cure was complete, but was assured that he would entirely recover within a few weeks.

The points of particular interest in this case were:

First. The unusual accident that apparently caused the attack; whether this may be taken as evidence to uphold the belief of the animal origin of the disease, I cannot say.

Secondly. The presence of extensive ulcerations.

Matthewson says these have occurred in only 12 per cent of the reported cases. These ulcers were not deep, as in squirrel plague ophthalmia.

#### BIBLIOGRAPHY.

- DeSchweinitz .....Text Book of Ophthalmology.  
 Fuch's .....Text Book of Ophthalmology.  
 Weeks' .....Disease of the Eye.  
 Kirkendall .....Medical Record—November 12th, 1912.  
 Matthewson .....Ophthalmic Record—December, 1914.  
 Arganaraz .....Abst. in Arch. des Ophthalm., January, 1913.  
 Verhoeff .....Archives Ophthalm., January, 1913.  
 Vail .....Michigan State Medical Society, Sept., 1914.

# SOCIETY PROCEEDINGS

## OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Session 1918, May 2-4, London.

The Society held its annual Congress on the three days, May 2nd to 4th, mainly at the rooms of the Royal Society of Medicine; and it was well attended, despite the war. The chair was occupied at all the meetings by the president, Mr. E. Treacher Collins, F. R. C. S. A special discussion was held on the second day at the Metropolitan Asylums Board Schools for Ophthalmia, at Swanley, Kent, on "Contagious Diseases of the Conjunctiva." (See p. 503.)

A special meeting of ophthalmologists from various parts of the Kingdom for the purpose of forming a Council of Ophthalmologists to watch over matters appertaining to the specialty was also largely attended by members of the Society. The decision to form such Council was unanimous, and the speeches delivered in support of the scheme strongly urged special training of men before they were allowed to take up the work of ophthalmology. It was decided that the Council shall be constituted as follows: All the past and present presidents of the Ophthalmological Society of the United Kingdom and of the Section of Ophthalmology, Royal Society of Medicine (to be permanent members), four members (elected annually) from the Councils of each of these bodies, and one representative of the Oxford Ophthalmological Congress.

### The President's Address.

In his inaugural address, Mr. Collins said this was not a Society which awoke into activity on three days in the year, and was dormant during the remaining 362. There were always arising matters of ophthalmologic interest which needed watching, such as the visual standards for the Army and other services, and the urging forward of the supply to the Army of the visor designed by Captain Cruise for the saving of much damage to eyes at the front from the dispersion of small particles

following explosions. The War Office had recently created the important post of Consulting Ophthalmic Surgeon to the Forces at Home, and he expressed the Society's congratulations to Colonel Herbert Parsons on being chosen to fill it.

With regard to the present outlook, numbers of men, during the war, were transferred from countries in which contagious ophthalmia was perennially rife to others in which the disease was of only sporadic occurrence, and, conversely, many who had no idea of contagious eye disease had been sent into districts where 90 per cent of the population had had active trachoma at some time. As these men would, in due time, return to mix with their kith and kin, he thought some concerted action should be taken with the view of preventing a repetition of the general infection of the population which occurred from the troops to this country from Egypt after the Napoleonic wars.

Now that members of the specialty in the United Kingdom had accomplished, through having only one journal, and through the affiliation of various of the provincial societies with this society, a much greater cohesion, representations in regard to the nation's eyesight would come with much greater force than in the past. There was still, he said, much room for improvement on such matters as safeguarding the eyesight of children from the strain incidental to school life, the provision of special curricula for short-sighted pupils, reduction of cases of blindness following ophthalmia neonatorum, and the setting up of minimal standards for certain occupations in which defective sight was dangerous. The Nettleship Prize and Gold Medal had been awarded to Lt.-Colonel Gordon Holmes, M. D., for his researches on disturbances of vision associated with cerebral lesions. The Bowman Lecture for 1919 would be delivered by Dr. Morax of Paris.

He followed with a scientific contribution on "Effects of Hypotony in Rabbits' Eyes."



### Histology of the Trephined Disc.

LT.-COL. R. H. ELLIOT, I. M. S., read "A Contribution to the Histology of the Trephined Disc," and supplemented it by a number of slides. For the best results, he said, the discs must be cut strictly in the meridional plane of the eye. For a trephining operation to be successful, it was essential for a portion of Descemet's membrane, or of the pectinate ligament, or both, to be completely removed. In every glaucomatous case he had examined he found thickenings on Descemet's membrane, at the point where it was about to break up to form the pectinate ligament, and always on the posterior surface. For that reason he concluded they represented the products of the activity of the endothelial layer of Descemet's membrane. Possibly their occurrence bore no relationship to the glaucomatous process, but they might be a result of the chronic congestion attending long-continued high pressure of the eye.

DISCUSSION.—Capt. T. Henderson regarded Descemet's membrane as a deposit due to the activity of the epithelial lining of the anterior chamber. The membrane in the fetal eye of both man and animals was very inconspicuous, and became larger and more prominent as age advanced. The anatomic cause at the bottom of glaucoma he considered was fibrous degeneration of the cribriform ligament.

The president said that in only one zone of the eye could a true filtering scar be secured, namely, as Col. Elliot said, at the sclero-corneal margin. The operator must keep well forward, and aim at getting away a complete circle of Descemet's membrane.

Capt. Cruise did not consider it necessary, in order to secure a good filtering scar, to excise a circular portion of Descemet's membrane. He had derived better results by employing a modification of Fergus' sclerotomy flaps, by which incision of Descemet's membrane was avoided.

Mr. Hosford agreed with Mr. Cruise, and expressed his preference for a modified Lagrange operation.

### Herpes Zoster Affecting the Ciliary Nerves.

MR. GEORGE THOMPSON read a paper describing four cases of herpes zoster affecting the ciliary nerves. Several members discussed the paper.

### Visor to Protect Eyes.

CAPT. R. R. CRUISE exhibited a new and much improved design of Army visor. Last year he showed the pattern he had then evolved, and the Society passed a resolution of cordial endorsement, urging the authorities to adopt it and supply as many as possible, owing to the proved saving of eyesight resulting from its use. As a result of the criticisms received following hard wear under service conditions of the previous design, he evolved the present pattern, which meets all objections, and is regarded as fool-proof. A central strut keeps the chain mail away from the nose, and forms the fulcrum for the action which places the mail on top of the helmet when not in use, and lowers it for use, the change being effected in one second. Its use does not interfere with accuracy in shooting, and in bright sunlight it sensibly modifies the glare. One of the objections urged against the former kind was that the rattling of the chains prevented silent patrol work. In the new form there are no chains to rattle, the movements being actuated by springs.

DISCUSSION.—Col. Lister considered the design a beautiful one, but the authorities evinced a surprising apathy about adopting it universally. He thought there would be an objection to wearing this visor in conjunction with the gas mask, especially in hot weather. Incidentally he remarked on the inability of many Army medical officers to recognize perforations in the eyes; some seemed not to know how to set about the examination.

Capt. Cruise replied that the visor was not needed so much when the gas mask was in position, as the celluloid eyepiece would stop many of the small particles which caused so much eye damage in battle. He was glad to be able to say that there was now a good deal of evidence of growing enthusiasm in favor of the mask among combatant officers.

### Tests for Thresholds of Light and Color.

MR. GEORGE YOUNG read a contribution on clinical tests for the threshold of light and color. Using standard inks as his basis, he produced fixed dilutions of over a thousand degrees and placed a circle of the color on each leaf of a small album. These leaves were fairly rapidly turned in the view of the patient. He said the album had enabled him to rapidly arrive at knowledge as to scotoma in any patient, and many observations had established a certain relationship between color-perception and some eye diseases. For instance, in the retinitis of pregnancy perception for yellow was markedly reduced, but not in the albuminuric retinitis of trench fever.

Dr. W. W. Sinclair spoke highly of the method, and confirmed some of Mr. Young's results.

### Blepharoplasty.

In the afternoon, a discussion was held on plastic operations on the eyelids. The chief item was a demonstration of numerous patients brought from Sidcup special hospital by Major Gillies, R. A. M. C., on whom various forms of plastic operation had been performed. In association with his paper opening the subject, he showed, by means of the epidiascope, numerous photographs illustrating the successive operative stages in approximating the appearance of these unfortunate men to that of ordinary members of the community. A number of American and British surgeons were present, some of whom contributed to the discussion, at the end of which a vote of thanks to Major Gillies was accorded by acclamation.

### Contagious Diseases of the Conjunctiva.

MAJOR J. F. CUNNINGHAM and CAPT. J. WHARTON had written an instructive paper on the subject which was read by Colonel Lister. The authors stated that the question of trachoma and ordinary conjunctivitis arose owing to the introduction of colored units into France. Nineteen per cent of the Egyptians brought into that country

had active trachoma, and 9 per cent of the Chinese. The infected cases were separated from men clean in this respect and were kept isolated from them throughout. Up to the date of writing, the authors had no knowledge of the disease having spread from these importations either to our own troops or to the civil population. It was satisfactory to note that the sickness-hours among the infected companies did not exceed those in clean companies. The importation of men showing trachomatous granulations or acute conjunctivitis had been stopped.

The chief object of the regular treatment administered was to keep the men fit for their work, and to prevent the spread of the disease. Camps for both Chinese and Egyptian labor companies were enclosed, and, except for work, the men were not allowed out of their camps. Under no circumstances was a man transferred from an infected to a clean company. Less than one man per month had been repatriated in consequence of the disease. The treatment carried out was the universal drop one. Once a day the men squatted in rows, drew down their lower lids, and while they looked upward a native orderly passed rapidly along and dropped two drops into each eye of the following lotion: Acid bor. gr. X, zn. sulph. gr. ii, water to one fl. oz. In this way, a whole company could be treated in about twenty minutes.

Col. Lister testified to the fine work done in this connection by the authors of the paper, and all the ophthalmic surgeons who assisted. Had not the men on their entry into the country been properly classified and segregated, the whole scheme would have failed.

THE PRESIDENT, who is consulting medical officer to the Swanley School, gave a short account of the work done there. The qualification for admission was very wide; all children having a discharge from the eyes being capable of being conveyed to the eyes of another child were eligible for admission. Since the institution was inaugurated in 1903, 7,163 had been inmates, and of these 1,697 were diagnosed as suffering from *trachoma*, and 5,466 other eye affections.



The trachoma cases are kept separate from the others. The arrangements for washing, bathing, sleeping and treatment were most scrupulous, and the appearance and brightness of the little colony was very obvious to the least observant.

The impression of the President was that trachoma was caused by an organism of ultramicroscopic dimensions, which did not seem to be transferred by air, but through the medium of the moist discharges. An exacerbation of trachomatous manifestations seemed always to be associated with the complication produced by some well known organism, such as the gonococcus. He considered that trachoma was not found anywhere but in the conjunctiva because of the thinness of the covering epithelium and the presence beneath the epithelium of delicate loose sub-epithelial areolar tissue. In trachomatous pannus there was a new formation of blood vessels and tissue, and this pannus occurred in the later stages of the disease, when the corneal epithelium had been softened by continuous chronic discharge. Very few of the children in this school had suffered from disease in the lacrimal passages; certainly not more than children who had ordinary conjunctivitis. Sometimes the areolar tissue was replaced by fibrous tissue, and then the disease was arrested. A very effective form of treatment was by carbon dioxid snow. (This was demonstrated to members by the Medical Officer, Mr. Tyrrell.)

**DISCUSSION.**—Mr. Tyrrell, in a contribution to the discussion, agreed that the application of CO<sub>2</sub> snow was one of the most successful methods of treating trachoma when the follicles were over the tarsus. When the schools were first opened, X-rays were used, but a difficulty was that the amount of reaction could not be gauged beforehand.

Mr. M. S. Mayou gave an exposition, aided by color diagrams, of his conception of the pathology of the disease, after which the discussion became general.

### Variable Paralysis of Ocular Muscles.

In the afternoon Colonel Lister demonstrated, at the Museum of the Royal College of Surgeons of England, a number of specimens of peculiar interest to the specialty, and the evening session was a clinical one. On the Saturday morning a number of interesting cases were shown and discussed at the National Hospital for the Paralyzed. Dr. James Taylor, one of the physicians there, demonstrated several cases in which a variable paralysis of ocular muscles was the chief feature. Usually the paralysis affected chiefly branches of the third nerve, and in some instances it was bilateral. He regarded them as instances of myasthenia affecting only the ocular muscles. Cases and contributions by Dr. F. E. Batten, Mr. Leslie Paton and Dr. Kinnier Wilson also formed part of a very interesting visit.

During the course of the Congress, a Museum, under the direction of Mr. A. C. Hudson, was open, in a room adjoining the discussion chamber.

### SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

January 17, 1918.

DR. S. LEWIS ZIEGLER, Acting Chairman.

#### Cysts of Iris.

DR. P. N. K. SCHWENK showed a man, aged twenty-four years, married, with two cysts of the iris in the right eye. One was of a semitransparent color with a few iris fibers crossing its anterior surface, measuring about three-sixteenths of an inch, slightly flattened by contact with posterior surface of the cornea, and situated at 10 o'clock. The other was highly pigmented, having denser iris tissue for its wall and about two-sixteenths of an inch in diameter, occupying 4 o'clock position. The two projected edges were nearly in contact occluding the lower three-quarters of the pupil, therefore interfering with vision. The patient still had most of two-fifths vision with glass correction of + 12 S  $\odot$  + 2 cylinder axis 90° in an aphakic eye. This pa-



tient first came under Dr. Schwenk's observation at Wills Hospital on July 13, 1916, when the following history was obtained: When thirteen years old he was struck in the left eye by a ruler in the hands of his teacher which caused blindness of that eye. Several months later a boy threw a stone at him which hit him in the right eye, causing impaired vision.

Examination showed slight convergence of globes, but muscular movements were normal. Both corneas normal. Left pupil 2 mm. and right 4 mm. Left eye media clear, large patch of choroidal atrophy with pigmentation in macular region and vision *nil*.

Right eye pupil 4 mm., slight reflex action, iris oscillating, lens dislocated up and out, at 10 o'clock, slightly swollen, T +. S.—3=6/15 vision. November 11, 1916, returned with deep ciliary injection, cornea steamy, keratitis punctata, pupil widely dilated, T +1., fundus reflex but no details. Alternatives were given and he was advised to have the lens removed, but he desired to go home and consult his family.

December 5, 1916, the patient returned with the ball less injected but having a glaucomatous expression. In consultation with Dr. Zentmayer, removal of dislocated lens was confirmed. Punctate deposits on posterior wall of cornea were pronounced and T + 2. The patient was admitted to the ward of the hospital and ordered to be prepared for operation two days later. On December 16, 1916, general anesthesia was given when the lens was removed after an iridectomy. Some lens cortex remained, but it was deemed advisable not to attempt its removal. The patient made an uneventful recovery and was discharged on December 20, 1916, with vision of 20/50 with a + 12 S  $\subset$  + 2 cyl. ax. 90° glass. December 1, 1917, nearly one year after lens extraction, patient returned with a clear cornea, broad iridectomy, at 12 o'clock, some unabsorbed cortical still present. Anterior chamber normal, eye quiet, some opaque capsule. Advised to return for capsulotomy. Iodides were given.

May 28, 1917, a web-like opacity showed in pupillary area but eye quiet.

October 9, 1917, patient returned with a large cyst of iris, at 4 o'clock, and a smaller one at 11 o'clock.

On October 11, a broad needle or keratome was passed from 4 o'clock, at limbus of cornea into cyst, point of needle extending through cyst wall into pupillary area evacuating contents of cyst. With a Tyrrell hook the cyst wall was engaged and cut off. When Dr. Schwenk looked for the other cyst it had collapsed and could not be found, showing that there must have been a common wall connection.

Cysts of the iris are very rare, and Dr. Schwenk considered the case of sufficient interest to show before the section. The cause is supposed to be an invagination of epithelium caused by trauma or operation.

#### Recurrent Pterygium.

DR. J. B. TURNER showed a man, aged forty years, who had during a period of ten years, eleven operations for recurrent pterygium. The conjunctiva of the lids becoming involved, the eye was enucleated six months ago, and there has been no return of the disease which the pathologist classed as a slow-growing carcinoma.

DISCUSSION.—Dr. Zentmayer said that malignant growths starting from pterygia were rare but not heretofore unknown. It would seem probable that in these cases there is an element of malignancy latent which is excited to activity by the operation for removal of the growth.

#### Orbital Tumor.

DR. WM. CAMPBELL POSEY presented the notes of 3 cases of orbital tumor. Case I was that of a woman aged twenty-seven years, with marked exophthalmus in the right eye, the exophthalmus which had appeared when the patient was about seven years old, being caused apparently by a hard, smooth mass, which could be plainly felt under the orbital rim at the upper, outer part of that cavity. Notwithstanding the displacement of the globe, ocular movements were good in all directions. Vision in the right eye was normal

and there was no limitation in the field of vision. X-ray examinations of the sinuses negative. Incision made over the most prominent portion of the mass gave escape to a large quantity of thick viscid material, the mass evidently being of a *dermoid* nature.

CASE II.—This was a case of *sarcoma of the orbit* in a man aged fifty-four years, who had been struck on the head and eye some ten years previously by falling timber. The affected eye had been enucleated elsewhere some four years previously, perhaps for sarcoma of the choroid, though the cause of blindness in the organ and the reason for its removal were unobtainable. The recurrence of the growth in the orbit, if such was the sequence, presented an unusual form, the tumor appearing as a firm black rounded mass, which occupied the position of the eyeball and extended downward and forward, resembling in its position and form a microphthalmic eye with attached cyst below. The mass was removed *in toto* by Dr. J. Milton Griscom in the absence of Dr. Posey, and the contents of the orbit eviscerated. Copious hemorrhage attended the operation and recurred at each dressing. Two weeks after the operation the orbit was subjected to a thorough electrical desiccation treatment by Dr. Clark, since which time the hemorrhages have ceased, and the orbit now shows signs of being filled in with newly formed tissue.

CASE III.—Female, aged eighteen years. Following an attack of typhoid fever when aged twelve years, glands upon the back part and upon the left side of her neck became swollen. This condition has persisted ever since. Health otherwise good. Family history negative. About a year ago noticed that the left eye was more prominent. This condition advanced until four months ago, when the protrusion of the eyeball became stationary. Upon examination, left eye is moderately proptosed down and somewhat out. Under the upper, outer part of the orbit a firm, slightly movable mass is felt, about the size of a large almond. Ocular movements limited, but no neuritis. X-ray examination of the si-

nuses negative. Incision made in upper, outer part of the orbit, just over the mass, revealing a more or less oval, firm\* encapsulated growth, easily removable and without connection to any important intraorbital structures. Rapid convalescence with slight scarring. Macroscopic appearance of growth suggests sarcoma. Microscopic report not yet received.

DISCUSSION.—Dr. Shumway said that in exenteration of the orbit in 2 cases at the Philadelphia General Hospital, one for recurrent carcinoma of the anterior part of the eyeball, and the other for sarcoma of the choroid, with extension into the orbit thru the sclera, he had asked a member of the X-ray department of the hospital to be present at the operations. After removal of the orbital contents the remaining tissue at the bottom of the orbits had been charred by the application of the desiccation spark, and no recurrence has been noted. In one case bleeding from the ophthalmic artery had been controlled by passing the current downward through the hemostatic forceps, which had been placed upon the cut vessel, and there had been no subsequent bleeding. He thought the method made the operation easier, and helped to prevent recurrence.

#### Variable Findings in Ocular X-Ray Localization.

DR. G. ORAM RING presented for study a man who had been struck in the left eye with a piece of steel ten weeks ago, the case applying at the Protestant Episcopal Hospital for treatment about five weeks after the accident to the eye.

The vision in O. D. is 20/25 and in O. S. 20/150.

At the time of the initial examination the eye was white and quiet, with evidence suggestive of penetration of the ball at two different points, a small central opacity at the pole of the cornea, with a corresponding spot on the lens capsule with traumatic cataract; and a second linear corneal scar down and in, with corresponding penetration of the iris just below the lower and inner pupillary border which was the



site of a broad posterior synechia. No satisfactory view of the fundus could be made because of the lens haze. Perception and projection were good. Upon strong illumination of the good eye, slight lacrimation was present and there was some obscuration of the upper, inner and lower edges of the disk.

An immediate X-ray picture showed the presence of only one foreign body, which was located 28 mm. behind the corneal pole, 3 mm. to the nasal side and 2 mm. above the horizontal plane, approximately in the position of the optic nerve. Inasmuch as the sensitiveness of the right eye rapidly subsided, and assuming that the foreign body was behind the eyeball, it was proposed to wait until the foreign body had probably firmly incased itself in exudate.

At the end of about two months an upward iridectomy was done with the intention of later extracting the lens. The view thus made possible through the lens periphery showed the presence of a small mass of exudate in the posterior part of the vitreous with a dark center which immediately suggested the importance of a second X-ray picture. This was made by Dr. H. K. Pancoast of the University of Pennsylvania. Still but one foreign body was located, but this time in the eyeball 21 mm. back of the pole of the cornea and 3 mm. to the nasal side and  $2\frac{1}{2}$  mm. above the horizontal plane.

In view of this second finding it was determined to proceed no further with operative intervention unless suggested by sympathetic symptoms.

This is the second case within a year that the author has been led astray by faulty localization, although it must be kept in mind that the clinical appearance pointed to the presence of two foreign bodies, whereas the X-ray plate in each case indicated one but in different positions. Dr. Ring's experience with the X-ray localization by the "Sweet Method" on the whole has been most satisfying and he proposes to have further X-ray studies in the hope of shedding additional light upon this rather unique case.

DISCUSSION.—Dr. S. Lewis Ziegler spoke of the possibility of having two foreign bodies in the same eye, only one of which showed on X-ray examination. He spoke of having seen such a case with cataract and siderosis, in which pain was elicited on application of the magnet. Upon operation a foreign body was removed with the lens, and a second foreign body extracted with the magnet through an incision over the ciliary body.

#### **Vernal Conjunctivitis Greatly Improved by Radium Treatment.**

Dr. Edward A. Shumway reported a case as already published in this journal (p. 404).

J. MILTON GRISCOM, M. D.,  
Clerk.

Meeting of February 21, 1918.

DR. S. LEWIS ZIEGLER, Acting Chairman.

#### **Tumor of the Orbit.**

DR. W. C. POSEY exhibited a case from whom he had recently removed a tumor of the orbit. The growth had occasioned marked exophthalmos, the globe being proptosed 11 mm. in front of its fellow. The incision was made as for the Krönlein operation, but the tumor, which consisted of an adenoma the size of a horse chestnut, was removed without interference with the bony wall of the orbit. Convalescence had been speedy, and now, three weeks after the operation, there was scarcely any evidence of the previous existence of the growth beyond a slight drooping of the outer part of the lid.

#### **Blindness from Ischemia of the Retina.**

DR. ARNOLD KNAPP, by invitation, reported on a number of unusual cases illustrating a definite group showing occlusion of the central retinal artery in which a cause cannot be found; this group is said to constitute about 30 per cent of the cases. In addition to these a case of embolism of the central retinal artery was reported occurring in a child, aged ten years, who had suffered from acute rheumatic endocarditis.

The following cases constituted the subject of the paper:



CASE I.—Embolism of the retinal artery in a child, aged eight years, who suffered from chorea.

CASE II.—Two cases of frequent obscurations which led to a permanent occlusion of one of the branches of the retinal artery. In both of these a most careful general medical examination was made without finding any definite cause, except in the first an anemia secondary to pulmonary tuberculosis, and in the second six abscessed teeth.

CASE III.—A temporary obstruction of the retinal circulation which was observed during an attack. The cause for this seemed to be an anomaly of the vessels at the optic disk and a momentarily reduced general blood pressure.

CASES IV AND V—Cases of closure of the central retinal artery with loss of sight of unquestionably infectious nature. The first a patient, who suffered from chronic streptococcus viridans septicemia, lost the sight in one eye with the picture of an obstruction of the retinal artery with some exudates and hemorrhages in the retina. In the second case the infection was obscure and both eyes were affected, one after the other, with subsequent and total blindness; the ocular diagnosis being a retrobulbar neuritis with involvement of the central retinal artery. The optic nerve head showed distinct inflammatory changes; there was a central scotoma in the right eye, retinal exudates and a shutting off of the retinal circulation. This patient, who also suffered from endocarditis, originally had an operation upon her antrum and had been running a regular evening rise of temperature for months.

DISCUSSION.—Dr. Zentmayer said he feared that he could not say anything in elucidation of the group of interesting cases Dr. Knapp had reported. He had at that time at Wills Hospital a case that belonged to the first group, that is, those occurring in children. The patient was a boy, aged twelve years, who suddenly lost the vision of his right eye. At first there was the picture of complete obstruction of the trunk of the central artery due doubt-

less to an embolus, as the boy has a valvular lesion of the heart. After a few days there appeared along the course of the inferior temporal vessel a large patch of exudative retinitis. It would seem probable that the embolus broke up and was carried into the branch and that it was septic. Many present probably recalled seeing Dr. Harbridge's case of spasm of the central artery of the retina in a man, aged fifty years. These attacks followed stooping and recurred on two successive days, lasting from thirty seconds to two minutes. The attacks ceased after the use of free purgation and nitrit of amyl. It was likely that the cause of the spasm of the vessel was an auto-infection just as in uremia we have a spasm of the cerebral vessels. Given the early changes of arteriosclerosis in the retinal circulation with superadded a low blood pressure and you have favorable conditions for the formation of a thrombus.

The condition of ischemia of the retina as a complication of mumps suggests the possibility of this being in the nature of the recently described symptom complex of uveoparotitis in which a uveitis sometimes precedes, sometimes following the parotitis, in the first instance it being a question whether both the uveitis and the parotitis are not due to a common toxic cause. It might be that the obstruction of the central artery was of a metastatic type.

Burton Chance, in commenting upon Dr. Knapp's paper, detailed a case of widespread retinal ischemia in the left eye of a woman in the sixth month of her fifth pregnancy, prior to which her sight had been unaffected. The ischemia involved the area supplied by several branches of the central vessel, as depicted in a sketch he showed made by the late Miss Washington. The case went to term safely, but after three months the circulation was found to have become completely restored, and the sight as before the sudden loss. In addition, Captain Chance referred to the frequent inconsistency between the degrees of intracranial vascular pressure and the appearance of the ret-

na. He recalled cases of superturgid cerebral vessels as found postmortem, in which at no time up to within a very short period before dissolution were there evidences of abnormal vascularity within the globes. In this connection he had in mind the findings in a number of fatal cases of cerebrospinal meningitis which had been under his observation in the recent epidemic at Camp Jackson.

Dr. Ziegler suggested that some of the cases of spasm of the retinal vessels may be due to disturbance of the parathyroids, and stated that he had seen a case of spasm which he considered due to this cause.

#### **Concussion of Eye and Removal of Two Bullets from Orbit.**

DR. HOWARD F. HANSELL reported his case. See p. 426 for full report.

#### **Perforation of the Cornea Persisting for Eight Months.**

Dr. Hansell spoke of this case, which has also been published in this journal, p. 426.

DISCUSSION.—Last year Dr. Zentnayer showed before the Section a woman who had had a corneal fistula for nine months. Closure was brought about by means of the Kuhnt keratconjunctivoplasty. As in most of these cases an iridectomy is necessary, the blade of the keratome may be kept within the anterior chamber and used as a support upon which to curette the fistula.

Burton Chance said Dr. Hansell's cases of persistent perforation of the cornea brought to his memory several cases of tardy closing of the wound after cataract extraction of which he had had the care when resident at Wills Hospital. At that time, when he saw so frequently purulent infection after wounds of the globe, he had wondered how so long a delay of closure was not accompanied by suppurative processes.

Dr. Ziegler called attention to the fact that he had previously related a case of corneal fistula of long standing that had been successfully closed by a corneal transplantation.

#### **Opticociliary Vessel.**

DR. A. C. SAUTTER exhibited a case

of congenital opticociliary vein, in the right eye of a man aged thirty-three years. There was no history of any previous ocular inflammation, excepting a mild traumatic conjunctivitis about sixteen years ago.

Vision in the right eye equalled 5/6; in the left 5/5. The anterior ocular segment of each eye appeared free from any abnormalities.

Ophthalmoscopic examination of the right eye revealed clear media, a nearly circular healthy disk with a small, slightly eccentric physiologic excavation. At the upper temporal border of the disk a cilioretinal artery was visible and at the lower temporal portion could be seen a vessel running apparently from the papillary vein outward and downward over the papilla to the disk margin where it abruptly disappeared. It was somewhat wider than the cilioretinal vessel present above, its widest portion being at the disk margin. In color it resembled an artery more than a vein but showed no vessel reflex. This vessel was crossed at about its inner third by a very small branch of the papillary vein. There was slight pulsation of the retinal veins where they entered the excavation but no pulsation of the anomalous vessel. Pressure upon the eyeball caused increased pulsation of the retinal veins with a blanching of the venous structures within the excavation including the central portion of the anomalous vessel, pulsation of which, however, could not be proved with certainty.

Otherwise the fundus showed no abnormal changes and nothing unusual was noted in the fundus of the fellow eye. Refraction in each eye was a low hyperopic astigmatism.

The writer was able to find in the literature but 12 cases of this congenital anomaly, 2 of which were arteries. These cases have been generally attributed to congenital dilation of one of the capillary anastomoses normally existing between the retinal and ciliary circulations. The writer's case resembles closely the case reported by Shoemaker in 1909, the relative location, size and color of the vessel being the same. While pulsation is absent,



it apparently communicates with a retinal vein. The collapse of the vessel in conjunction with other venous branches upon pressure on the globe would seem conclusive evidence in favor of considering it part of the venous circulation, but whether the direction of the blood stream is the same as in the retinal veins seems impossible to determine with the ordinary methods of examination.

### Essential Atrophy of the Iris.

DR. WILLIAM ZENTMAYER reported the case of A. B., aged twenty-three years; spinner, of Polish parentage; parents living and well; two brothers, three sisters living and well; seven brothers and sisters dead, all in childhood. The patient was poorly nourished; had measles when seven years of age; no other illness except carbuncle three years ago. Suffered severe headaches about every three weeks. Seven or eight months ago he noticed halos around light only at night. Since fall the sight had been foggy in the morning. No pain. The eye was never inflamed. Never wore glasses. Wassermann, negative. Von Pirquet, strongly positive. Vision: R. E., 5/5; L. E.,  $-0.75 \text{ C} - 2.00 \text{ cy. } 90^\circ = 5/8$ . Tension: R. E., 18 mm.; L. E., 30 mm. R. E., fundus normal; L. E., cornea hazy, no fundus changes. Field was full for form but the color fields were contracted. R. E., cornea hazy. The iris presented in its nasal quadrant a partial atrophy of its stroma, but as yet there were no holes.

In 1913 Dr. Zentmayer exhibited before the Section a similar case in a woman, aged twenty-three years, in whom the atrophy advanced in the short time the patient was under observation (seven months) from a few small holes to an almost complete destruction of the nasal half of the iris. In 1915, before the American Ophthalmological Society, de Schweinitz reported a case almost identical with Dr. Zentmayer's first case and referred to two other very similar cases, one by Wood and one by Harms. In his own case the patient was a female, aged twenty-three years, who presented a

low nervous resistance probably due to tuberculosis.

DISCUSSION.—Commenting on the suggestion that the changes were probably due to alterations in the vessels, Dr. de Schweinitz said that no explanation was offered as to the nature of these changes or how they caused the atrophy. He offered as a possible explanation the action of an autotoxic agent. In the first number of the AMERICAN JOURNAL OF OPHTHALMOLOGY Feingold records the pathologic findings in a case somewhat like these. He found slight infiltration and pigmentation around Schlemm's canal. The defects in the iris were limited to its ciliary portion and consisted of atrophy of all of its layers and degenerative changes in the bloodvessels. In explanation of these alterations his thoughts turned to possible embryonic malformation of the vessels. As in Wood's case there was cavernous degeneration of the optic nerve. In a small area of the retina, on the temporal side of the papilla, there were large cells occupying the position of the ganglion cells. Their nature was not determined. He concludes that his case offers no positive explanation for the clinical entity although some features could be interpreted as that of a congenital vascular disturbance in the neighborhood of the smaller circle may have induced the changes in the iris.

### Zonular Opacity of the Cornea.

DR. WILLIAM ZENTMAYER presented the case of G. B., aged sixty-two years painter. No personal or family history bearing on the present eye condition. Last spring on being tested for glasses he discovered that with the right eye he could see only the outer half of an object looked at. The eye had never been inflamed nor painful but occasionally watered. For the past five weeks he had noticed an increasing dimness of vision in the left eye. Vision: R. E., blind; L. E., 5/6. Tension: R. E., 50 mm.; L. E., 12 mm. The R. E. presented a dense opacity extending horizontally across the lower third of the cornea with a temporal and nasal upward extension on either



ide of the pupil. The overlying epithelium was roughened and in places esicular. The iris was bound down to the anterior capsule of the lens, was discolored and had large blood-bearing vessels crossing its surface at right angles to the radial fibers. The cornea was anesthetic. In the left eye there was a zonular band symmetrical with that in the right eye but much less dense and the overlying epithelium still uninvolved. By oblique illumination the opacity was almost ground glass in density and was uniform except for a small, comparatively clear spot near the middle. The sensibility of the cornea was diminished. In other respects the eye was normal.

An interesting feature of this case was that in one eye the opacity was associated with an iridocyclitis with secondary glaucoma and blindness, whereas in the other eye, aside from the opacity, the eye appeared normal. From this it was difficult to say what was the sequence of events in the first eye. Possibly in this eye the opacity was secondary. In the second eye it would appear to be a senile dystrophy.

According to Fuchs this is the most common of the corneal dystrophies. He recognizes two forms, one secondary to destructive iridocyclitis and glaucoma, the second as a senile primary corneal condition. He has also observed it resulting from the long-continued impact of fine forming particles against the cornea.

The opacity begins near the limbus on either side of the cornea in its lower third and progresses toward the middle so that the portions toward the limbus are always more extensive and at first the central part of the cornea may be uninvolved. Under magnification it is found to consist of minute dots lying beneath the epithelium, the latter often being shagreened. Histologically the opacity consists of minute calcareous particles. Where these are the densest there is new formed connective tissue which may either extend toward the surface, causing the unevenness of the epithelium seen clinically or posteriorly, breaking through Bowman's membrane.

### Examination of First Draft Men.

CAPTAIN BURTON CHANCE presented the resumé of his study of men of the National Army assigned to Camp Jackson, Columbia, S. C., published in full p. 318.

DISCUSSION.—Dr. Hansell said that the examination of the eyes of registrants by him, as a member of the Advisory Board of the Jefferson Hospital, had been difficult by reason of his desire to comply with the rules governing acceptance or rejection and his own ideas of the needs of the Government. The rejection of men whose vision was less than 20/100 and 20/40 meant the loss of many men who were eligible for almost any branch of the service. The Advisory Board was requested to assign men for selective service, yet the rules for the standard of vision absolutely prevented any choice by the board. No provision was made for the *careful* examination of men and so they were unable to tell in many cases whether vision could or could not be improved to the standard. The standards were entirely too high. If the Advisory Board was to have any selective power, and if the Board was made up as it was supposed to be, of experts in the various lines, the Board itself should set the standards. For example, a man is to be rejected because he has a progressive ocular disease: vision so bad that he can only earn his living as a laborer; an infectious disease; recurring inflammation and the possibility of sympathetic ophthalmia; or may become invalidated because of his eyes. All others should be accepted either unconditionally or for selective service.

Dr. Posey said that as an officer of one of the local draft boards since the commencement of the war he was satisfied that the visual standards as now laid down by the Government were excellent, and that a soldier could not possess safely less than 20/100 vision in each eye, for with a lesser degree of visual acuity it would be impossible to escape accident in many situations in which a soldier would necessarily find himself. He called attention to the fact that there were no specialists

among the medical examiners of local boards, and that the Government had appointed the Medical Advisory Board for all kinds of special examinations. The oculists on such boards must be prepared to weed out malingerers, and in case of need to bring the vision in one of the eyes to 20/40 as per instructions from Washington. The work, then, of the medical advisory boards was of the greatest importance and could not be underestimated.

J. MILTON GRISCOM, M. D.,  
Clerk.

## COLORADO OPHTHALMOLOGICAL SOCIETY.

March 16th, 1918.

DR. DAVID A. STRICKLER, presiding.

### Penetrating Eye Injury.

DR. W. F. MATSON presented Mr. M., age 28, locomotive engineer. He was struck in the right eye, November 6th, last, while splitting kindling. There was a punctured wound of the cornea, iris, and anterior lens capsule, and a traumatic cataract subsequently.

A great deal of lens debris appeared in the anterior chamber from time to time following this injury, but the lens had not been needled and there had not been any elevation of the tension. Atropin and dionin had been used locally.

DISCUSSION.—DR. WM. C. BANE saw this case shortly after the injury and he was pleased to see the improvement since that time. He stated that Dr. Irvine, of Salt Lake City, and others use the keratome for making an incision at the upper limbus, then after the keratome has entered the anterior chamber they turn the point into the lens. Following this they irrigate the lens capsule with normal saline and wash out all of the lens debris.

### Irrigation of Anterior Chamber.

DR. BANE exhibited an irrigator which he had made for this purpose. He used this in a man, age 27, shown at the February meeting of this Society.

DISCUSSION.—DR. E. T. BOYD said he irrigated the anterior chamber often. He uses the Teal tip bent at a 45 de-

gree angle. He makes a keratome incision 5 to 7 mm. long before using the irrigator.

DR. F. R. SPENCER stated that he used a large douche can and a flat tip curved on the flat, as this answers all the requirements and avoids the expense of some special piece of apparatus.

DR. E. R. NEEPER said he used a syringe with a long glass tip bent at an angle of about 20 degrees.

### Corneal Ulcers.

DR. EDGAR F. CONANT presented Mr. W. F., aged 52½, ranchman, subject to rheumatism for 27 years. Denied syphilis and gonorrhea. However, six years ago and again last year he had small corneal ulcers O. D. In February and August, 1917, he had large central corneal ulcers O. S. The first one healed without perforation, but the second perforated. On March 8, 1918, he consulted Dr. Conant, at which time his symptoms were dimness of vision, photophobia, purulent conjunctivitis, and more or less deep pain in O. S. Examination revealed purulent conjunctivitis and a dense cataract in O. S. with an irregular pupil and posterior synechia. There was no increased tension O. U. The patient had used atropin at his home from time to time since last August. V. O. D., counted fingers at ten feet, and this was not improved by lenses. V. O. S., L. P. only. Given the usual silver nitrat and argyrol treatment for his conjunctivitis. Later this was changed to zinc solution without material benefit. The pain was much less severe when he used powdered dionin and atropia. However the photophobia persisted. The pus from the conjunctival sac had not been examined bacteriologically.

DISCUSSION.—DR. E. R. NEEPER said he would have the accessory sinuses examined by a competent rhinologist and a roentgenologist and he would also have a competent bacteriologist examine the pus from the conjunctiva sac and from the tear sac. He believed that much of the pus was coming from the tear sac.

DR. E. T. BOYD said this patient reminded him of his case of posterior lenticular opacities, in which neither

sugar nor albumin were found by the family physician. Later he had an expert laboratory diagnostician examine the urine and sugar was found.

Dr. F. R. Spencer said he had all cases of pus from the conjunctival sac examined bacteriologically as a routine.

### Eye Injury.

DR. WM. C. BANE presented Mr. C. T., aged 20, with the following history: On March 2d he was struck on the left eye with a snow ball and knocked down by the blow. The vision of this eye was disturbed and marked swelling followed the injury. On March 7th, V. = L. P. There was marked congestion of the orbital tissues, and hyphema. Atropin caused pain and increased tension. Eserin relieved the pain and reduced the tension (by palpation) equal to that of the fellow eye. At the time of the meeting the light perception was good and the blood had disappeared from the anterior chamber. A view of the fundus was not obtainable, presumably on account of intraocular hemorrhage.

DISCUSSION.—Dr. Geo. F. Libby was reminded of a patient who had been struck with a snowball. The tension was elevated; there was pain; and a rupture of the choroid was found at the macula, with blindness, when the vitreous cleared up enough to make the examination. Atropin was used and the tension became elevated. The pain increased. When eserin was used the pain subsided and the tension became normal.

Dr. W. H. Crisp referred to an elderly Jew whose condition he had reported at a former meeting of this society, in whom the atropin was used and the tension became elevated with an increase in pain. When the eserin was used the pain disappeared. The lens was found in the vitreous chamber later.

Dr. Edward Jackson said the lens was back of the pupil in Dr. Bane's case although it may have been eccentric. There was a poor nasal field for light projection and this may have been due to a clot, altho, of course, the

retina may have been injured at this point.

Dr. E. R. Neeper said the atropin should have been used in spite of the pain, as the pain will disappear and the tension will become normal if the atropin is continued. He asked how much eserin and the percentage of the solution necessary to counteract atropin. These cases are sure to have pain the first 24 hours with or without atropin.

Drs. Aufmwasser and Spencer said eserin would have very little effect in counteracting the atropin the first 24 hours. But after that it will begin to have some effect. It takes much eserin to counteract the effect of a small amount of atropin.

Dr. E. T. Boyd said the elevated tension in these cases is relative. It is hard to detect this absolutely with the finger. The eserin, he believes, is rarely indicated, but it must be used often if we are to accomplish anything.

Dr. Bane said he did not see this patient until five days after the injury. The pain was very severe under atropin, so severe the patient could not sleep, but he could sleep after eserin was used.

Dr. E. M. Marbourg spoke of a case he had presented before this society in which the lens was forward and the tension elevated. Eserin was used to advantage. He believed the blood clots raised the tension temporarily.

Dr. E. R. Neeper said the iris was uneven. Possibly there were posterior synechias to hold the iris immobile, even if the pupil had been previously dilated.

### Hole in Macula.

DR. H. R. STILWILL presented a man, age 30, army recruit, who had been working as a fruit packer. Italian. V. O. D. 20/20; V. O. S. 20/100. There was a hole in the macula of O. S. with a great deal of choroidal pigment in and about the margins. He was struck in this eye with a rock several years ago.

DISCUSSION.—Dr. Jackson said this may be classed as a hole in the macula, as in most cases there was no noticeable depth to these. All are pigmented.



He said there was not any appreciable depth to the fovea, yet it is deeper than the surrounding retina. This lesion was old and not progressive.

Dr. G. F. Libby said he noticed two glistening points which were probably due to cholesterolin.

### Entropion of Lower Lid.

DR. EDWARD JACKSON presented a man, aged 72, who had first been seen for a corneal ulcer of O. S. with entropion of the lower lid; the lashes of the middle third continually rubbed the cornea. In addition to treatment for the ulcer the lower lid was cauterized with caustic potash; the sharpened stick being drawn parallel to the lid margin and about 4 mm. below it until the skin turned brown. After more than five years, the lid margin remained in good position with the lashes well everted. The rounded, thickened, lid margin, due to the original trachoma which had become cicatricial before the patient was first seen, caused an eversion of the lower punctum which required slitting to admit tears to the canaliculus. O. D. was almost useless from haziness and irregularity of the cornea.

### Congenital Dislocation of the Lenses.

DRS. MELVILLE BLACK and E. T. BOYD presented Mr. T. D. with congenital dislocation of lenses. V. O. D. 20/200-20/70 + 11. sph. V. O. S. 20/200 = 20/100 + 11. sph.

DISCUSSION.—Dr. F. R. Spencer said these lenses were less eccentric than in his patient presented before this society in March, 1911.

Dr. W. H. Crisp suggested an iridectomy above in both eyes and later needling of the lens if necessary to improve the patient's vision.

Dr. Jackson said if you could get absorption of the edge of the lens in the pupillary area you would certainly improve this patient's vision. Such lenses are difficult to needle, as they usually move easily. However, an operation may be indicated. If the lenses are well fixed he wouldn't operate. Extraction of these lenses might be better than needling, but this too would be difficult.

### Exophthalmos Due to Ethmoidal Disease.

DR. E. E. McKEOWN presented Mrs. J., who had been troubled with her eyes for the past twenty-five years and a short time ago O. D. became a great deal more prominent than O. S. Takes cold easily and had slight amount of watery discharge. Her physician said that she was apparently healthy. Teeth all out.

O. D. more prominent than O. S. by 5 mm. O. S. more prominent than normal. No increase of tension in either one. Pupils reacted to light and accommodation. The veins, O. D., seemed to be enlarged, but no diminution in the size of the arteries. O. S. seemed to show more redness in the center of the disc than normal. This may have been from a hemorrhage. Macular region apparently normal. Two pigment deposits on the temporal side of the disc. Examination of the nose revealed many polypi.

DISCUSSION.—Drs. Marbourg and Spencer said they were able to palpate a firm tumor mass at the upper inner angle, O. D.

Dr. Edward Jackson said Graefe's sign was present O. U. However, O. D. showed this more markedly. He was surprised that the patient had not shown any symptoms of exophthalmic goitre. He was unable to feel what he thought to be a tumor mass.

Dr. H. R. Stilwill had been able to palpate such a mass.

### Iridocyclitis.

DR. D. A. STRICKLER presented Mrs. W., aged 25. She appeared for treatment August 28, 1917, with a history of having first noticed irritation and inflammation of O. D. six weeks before with a sensation of a foreign body in the eye. She was in the hospital from Wednesday until Saturday, three weeks before, with doubtful improvement. At the time of the meeting, there was a broad, bluish red, deep pericorneal injection, more marked above and to nasal side; pupil slightly dilated; media cloudy; photophobia; tenderness over ciliary body; and sensitiveness to motion. The pain at night

kept her awake. Atropin and Japanese hot box were used locally and byronia internally, with almost immediate relief of pain, redness, and tenderness. September 19, 1917, she returned with only slight pericorneal injection, at which time was first noted punctate keratitis together with pigmentation of anterior lens capsule (remains of posterior synechiae). V. O. D. 20/100 = 20/20 + 0.75  $\subset$  +2.25 ax. 80. V. O. S. 20/40 = 20/20 + with + 1.00  $\subset$  +0.50 ax. 90.

On Nov. 26th, she reported that the eye had been free from inflammation until two days before, when it suddenly became red, but not painful. Vision with glasses 20/20 O. U.

On December 28th, she again reported with an inflamed eye and an increase in the punctate keratitis. Finding no evidence of focal infection in the nasopharynx, the teeth were X-rayed with a diagnosis of root abscesses of the right upper bicuspid and molars. Their removal was accordingly advised and performed with no apparent improvement by January 18, 1918, when she again appeared. At this time a positive Wassermann was found and antiluetic treatment instituted. In all, six intravenous treatments of neosalvarsan were given together with mixed treatment. Descemet's membrane was well dotted thruout, but vision with correction remained 20/20.

On February 18th, she reported that the eye had been much worse. Vision with correction 20/70 with central corneal opacity from coalition of deposits on Descemet's membrane. The complement fixation for gonococci was negative. Wassermann slightly positive. Von Pirquet positive. The urine (catheterized specimen) was loaded with staphylococci, pneumococci and colon bacilli. A marked leucorrhea with some cervical erosion was found, but no gonococci. She had become discouraged and objected to the mercury, as the gums were sore, when it was decided to direct the treatment against the bladder and vaginal disease, together with the K. I. She has made definite improvement in every way since. V. 20/30.

**DISCUSSION.**—Drs. Crisp and Libby each spoke of the pigment over Descemet's membrane and the fact that the patient had been so much better since having treatment for the bladder and uterus. Dr. Crisp suggested the advisability of further treatment, if necessary, and perhaps mercury later.

Dr. Edward Jackson suggested the advisability of giving tuberculin later if she does not continue her improvement.

#### **Tuberculous Scleritis.**

DR. H. R. STILWILL made a subsequent report on the case of tuberculous scleritis shown at the February meeting of this society. He stated that the Wassermann was negative and the complement fixation test for Gc. was also negative. The tuberculin test was positive.

#### **Eye Injuries.**

DR. E. E. McKEOWN reported two cases: One, a boy struck in the eye with a piece of wood who was unable to close the lids. The second boy was struck by a rooster's beak and the sclera was perforated so that the vitreous ran out of the wound.

#### **Wood Splinter in Orbit.**

DR. E. M. MARBOURG reported a boy with a piece of wood  $\frac{1}{2}$  by  $\frac{1}{16}$  in. between the eyeball and the lower lid for two weeks. This came out easily. There was very little reaction and a good result.

FRANK R. SPENCER,  
Secretary.

### **WILLS HOSPITAL OPHTHALMIC SOCIETY.**

Meeting of May 6, 1918.

#### **Retinitis Proliferans.**

DR. WILLIAM ZENTMAYER said that this condition is of extreme interest and importance, because of the still unsatisfactory status of the etiology of many of the cases of vitreous hemorrhage which occasion it, and because of the very unfavorable prognosis. In the cases of relapsing vitreous hemorrhage in juveniles the bleeding occurs in two forms, which often present themselves in opposite eyes of the same individual: one, as a massive hemorrhage

which diffuses itself thruout the vitreous and prevents light reaching the fundus; and the other, as multiple retinal hemorrhages which gradually escape into the vitreous.

It is probable that there are several causes for the hemorrhages; tuberculosis, syphilis, gout and endotoxins, diabetes, etc. Other factors, some related to, and others independent of these general causes, are blood pressure and alterations in the blood affecting its coagulability. The latter conditions are inconstant. In some cases the blood pressure is low, in others high. In some cases the coagulability is too rapid, in others too slow. According to Collins the coagulability is raised and this leads to the formation of thrombi in the venules which rupture as the result of the vis a tergo.

Oguchi studied the development of so called retinitis proliferans experimentally in rabbits by injecting blood into the vitreous. He found that the blood was removed from the eye partially by way of the central vascular canal. The greater part, however, was disintegrated in situ and taken up by migratory cells, which originated from the ciliary processes and the connective tissue network of the papilla; and subsequently traveled in part to the papilla and in part to the inner surface of the retina. The mechanical irritation caused by these cells resulted in glial hyperplasia of the retina, together with a migration of retinal pigment. He concludes that true retinitis proliferans arises from a connective tissue formation derived from the perivascular tissue of the papilla. There must be contact of the vitreous hemorrhage with the surface of the papilla.

Suguwuma, from anatomic studies and experimentation, concludes that the new-formed tissue comes from the glial fibres of the retina, as well as from the connective tissue subsequent to the hemorrhage; and believes that in all probability it may exist without prior vitreous hemorrhage.

According to Collins and Mayou, the steps of the process are as follows: if the coagulation of the blood is high coagulation takes place more rapidly

than usual and absorption takes place slowly. The corpuscles discharge their hemoglobin, the stroma is broken up and cholesterin is formed. The fibrin either is absorbed or organizes. The endothelial cells from the blood vessels spread into the vitreous and bands of connective tissue form.

Dr. Zentmayer has recently observed the following cases:

CASE 1. Male. Age 18. (This case has been previously reported in brief.) Thoro physical examination was negative. The von Pirquet test was negative. The blood coagulation time was normal. When first seen in February, 1917, the left eye had light perception. The vitreous was so opaque that no reflex was obtained from the pupil. The right eye had nearly normal vision, and there were numerous hemorrhages in the retina in the region of the ora serrata. By September, 1917, the vision in left eye was nearly normal, and vision in the right eye 15/150. At the present time, V. O. D. = 15/100 and V. O. S. = 15/10. In the right eye there are dense fibrous bands, forming a complicated network with new blood vessels throughout the vitreous. He has recently had an attack of epistaxis.

CASE 2. E. B. Female. Married. Age 33. (Patient of W. T. Shoemaker.) First seen in May, 1917. Vision, O. D. 20/50, O. S. 1/100. In the right eye there was marked proliferating retinitis. In the left eye the vitreous was filled with hemorrhage. The vision of the right eye had fluctuated greatly, but there had been practically no change in that of the left eye up to the time of using fibrolysin in January, 1918. The Wassermann was negative. No record of tuberculin test can be found. Blood pressure, 115 systolic and 65 diastolic. Coagulation time 12 minutes. X-rays of sinuses and head negative.

CASE 3. M. S. Female. Age 53. Single. V. O. D. Fingers at 1 meter. V. O. S. = 20/50. Vision has been failing for one year. Has been under treatment for diabetes for past 2½ years, and has gangrene of one toe. In the right eye there is typical retinitis



proliferans and in the left eye retinal hemorrhages.

CASE 4. A. S. Male. Age 23. Seen in consultation with Dr. P. H. Kleinhans, in April, 1918. V. O. D. 1/60. V. O. S. 15/30. In the right eye the central and lower part of the vitreous was so dense with newformed tissue and hemorrhages that no reflex was obtained. In the left eye there were many retinal hemorrhages in the peripapillary region. The young man was in good health. Physical and laboratory tests negative. Constipated. No epistaxis. Coagulation time normal. One brother supposed to have died of phthisis.

In the first two cases the treatment was much the same. Iron, potassium iodid, or the syrup of iodid. The effect of treatment was uncertain as under treatment one eye improved while the other grew worse, in two of the cases closely observed.

In the second case, because of the failure of the left eye to improve while the right eye continued to fail, it was decided to try fibrolysin. As the patient lived at a distance, it was deemed expedient also to use every other method which offered any hope at the same time. This made it impossible to assign to any one agent the credit for the slight improvement which resulted. Twelve doses of 2.3 cc. of fibrolysin were given in the course of one month. At the same time subconjunctival injections of salt and dionin were used. At the end of that time V. O. D. = 15/50 and V. O. S. = 1/200.

It will be seen that in these three cases there has been no constant finding in the physical examinations. The Wassermann was negative in all. The tuberculin test was positive in one, negative in one, and in one not record-

ed. Blood pressure was normal in all cases. The coagulation time was normal in two cases and slow in one case. In one case the cause was undoubtedly diabetes.

The treatment should be especially directed to proper living, and particularly to ventilation and food. Drugs should be given according to indications. No remedy is at present known which will arrest the cause of the hemorrhages. The one drug which seemed to give the best results was the iodid of iron in large doses. Fibrolysin is worthy of further trial.

#### **Enucleation Under Local Anesthesia.**

DR. WM. M. SWEET exhibited a man with recurring attacks of iridocyclitis whose left eye was removed under local anesthesia, a cardiac condition preventing the use of ether. The anesthesia was secured by the injection, in the region of the optic nerve, of a one per cent solution of novocain, with five minims of adrenalin solution, 1-1000, to each dram. A half curved needle, somewhat shorter than that recommended by Siegrist, was passed along the lower border of the external rectus muscle to the back of the globe, and about two drams of solution injected. The needle was then withdrawn and passed below the internal rectus, and the same amount of solution injected on the nasal side of the optic nerve. In a few minutes the eyeball became proptosed and the conjunctival vessels empty. About five minims were then injected at the point of insertion of each of the recti muscles. There was no pain at any stage of the operation. After removal of the globe, a gold ball was implanted in Tenon's capsule.

HAROLD W. HOW, M. D.,  
Secretary.

# PHENOMENA OF NEUROBIOTAXIS IN THE VISUAL APPARATUS.

C. U. ARIENS KAPPERS,

AMSTERDAM, HOLLAND.

Abstract translation by Edmond E. Blaauw, M. D., Buffalo, N. Y., of an address delivered in honor of the Twenty-fifth Anniversary of the Netherlands Ophthalmological Society, June 9th, 1917. At the International Congress of Medicine in London, August, 1913, Prof. Kappers brought before the Section on Anatomy and Embryology his views regarding neurobiotaxis, the grouping of cells in the most efficient functional combinations by their displacement in the direction of a source of stimulation. The present address illustrates his views by consideration of the nuclei concerned with ocular movements and the arrangement of retinal elements, and gives a rational explanation of the cell groups in question.

Since the discovery of the phenomena of taxis and tropism they have kept the interest of the investigators. Especially since the eighties we have a number of observations which have been of value for our understanding of the forces which exercise a determining influence on the forms, movements and acts of the organism.

The world seemed interwoven by a mystery of force lines previously unknown, which help in building up life and direct it as a passive object, which is only a product of its surroundings in its growth and action. In the beginning not rarely it was overlooked, that life itself has its OWN forces and that this in many instances determined why now this force exercised the greatest influence, now this form or direction and then its reverse was produced by one and the same influence.

Quite early these tropisms were considered in the mutual organization of the different cells in a living organism; and it is now just 25 years since S. Ramon y Cajal's brilliant investigations have appeared. He was the first who realized that very distinct tropistically acting factors influence the texture of the nervous system. His opinion was based on embryologic material. He supposes different chemical secretions as factors for the tropisms during the embryologic development of the nervous system. Later he asserts, that this chemotactic hypothesis cannot give an explanation of the facts. He made, however, a suggestion, which seemed of greater significance than his chemotactic doctrine, of greater significance than even Cajal himself real-

ized, namely: his observation "that, when a sensible region of the brain, after a period of rest gathers a new number of axis cylinders and receives a new group of excitations the cells strengthen their connection herewith in a double way, either by sending out a new dendrite, or by a displacement of their body self in that direction." Or, when an excitation center becomes enlarged, then nerve cells which are connected thru dendrites, can strengthen this connection thru a new dendrite, or by their own displacement toward it.

Kappers' own investigations began without knowledge of this sentence, and had brought him to the same conclusion, altho along other paths. The observations were made on grown-up material, and especially on the lower animals, the brain structure of which is simple and surveyable. They began with a surprise about the peculiar place, which the nuclei of the ocular muscles of some fishes have. The nucleus abducens in the codfish has a very ventral position, not far from the base of the oblongata. This position was found rather constant in bony fishes (teleosts). The relation in the sharks is entirely different. Here the nucleus lies in a very dorsal position.

The sixth nucleus seems in its most primitive condition in the Lampreys; it is found to be included in a frontal cellular column, which lies in the anterior part of the oblongata; in which column also the trigeminus and facial nuclei lie. The nucleus lies here dorsal and before the seventh nucleus; and its root emerges with that of the trigeminus before the root of the facial.

The condition changes in the higher fishes in so far as the nucleus lies behind the exit of the seventh root, therefore is displaced backward in the region of the oblongata, where the nervus vestibularis enters and chiefly ends. The nucleus in the sharks takes a more caudal place than in the bone-fishes and has also a dorsal position, while in the bone fishes it lies on the level of the facial root, and takes nearly always a ventral place.

Of the two chief systems which influence the nuclei of the ocular muscles, the vestibular and the optic reflex systems, the first is the strongest in the sharks, which possess on account of this an enormously developed posterior longitudinal fasciculus. Numerous short and long reflex arcs originating in the vestibular end region of the oblongata pass in or next to the posterior longitudinal fasciculus, at the lateral side of which the abducens cells lie scattered, in these animals. Also the optical reflex arcs are well developed in the sharks and divide over the area of the above fasciculus and the base of the oblongata.

The last system: the so-called ventral tecto-bulbar tract takes gigantic dimensions however in the bony fishes. Moreover strong vestibular reflex arcs are present at the base of the oblongata in these animals. The dorsal vestibular reflex arcs are on the contrary in the bony fishes very little developed, much less than in the sharks. It is therefore not to be wondered at, that the ventral reflex arcs exercise a much stronger influence in the bony fishes. This appears as well from the ventral position of the nucleus, exactly on the ventral optic reflex arc, as from the fact that the abducens nucleus takes a more frontal position in the bony fishes than in the sharks. Which is in harmony with the frontal origin of these optical excitations and also with the fact, that the abducens nucleus in the plaices has a still more frontal position than in the other bony fishes, on account of the still stronger development of the fronto-ventral optical reflex arcs, in these animals.

*We find in the different representatives of the fishes a different position of the nucleus of the sixth nerve. Which finds its explanation in every special case in the stronger development of one of the chief reflex arcs for the ocular movements. In the sharks the enormous developed organ of equilibrium with its dorsal reflex arc; in the bony fishes the strongly developed ventral optical system.*

For all animals higher than the fishes the dorsal position of the abducens nucleus is the rule. Among the amphibians this is not so striking in the frog, because here the posterior longitudinal fasciculus is separated from the bottom of the fourth ventricle by a rather considerable layer of cells. The sixth nucleus however lies here also against the fasciculus.

The abducens nucleus still lies very caudal in the amphibians, and even reaches the ninth root, showing thus a great resemblance with the sharks.

In the crocodiles the nucleus begins in its dorsal position to shift forward, demonstrated as a frontal elongation of the nuclear column. The posterior pole of the sixth nucleus keeps at first its caudal position, which gives the nucleus a greater length but less compactness. In the land-living reptiles, the birds and the mammals, the posterior part of the nucleus moves forward, which makes the abducens nucleus more compact and shorter, it being located just before the position of the seventh root entrance.

The cause of the successive frontal displacements is probably the location of the frontal part of Deiters' nucleus and of the dorsal vestibularis nucleus, which form the chief reflex centers for the sixth nucleus in these animals. This is also demonstrated by the dorso-lateral position, which the abducens nucleus occupies in most mammals. Only in the carnivora, cetacea and insectivora a location is found directly next to the posterior fasciculus, and under the horizontal seventh root. In all other mammals the nucleus is moved dorso-laterally, and nearly forms one whole with the dorsal vestibular-nucleus. This lateral displacement results in the seventh nucleus lying not more be-



low, but at the side of the horizontal seventh root.

The phylogenetic consideration of the places taken by the sixth nucleus shows most clearly, that its topography is determined by the strongest stimuli which excite the nucleus; they are different in different animals and these differences show us neurobiotaxis as an important factor in the building up of the nervous system. This described phylogenetic frontal displacement is repeated in the ontogenesis, as demonstrated for bird and human embryos.

The shiftings of the nucleus trochlearis are not less evident. In the lamprey this nucleus lies above the fourth ventricle in the base of the cerebellar origin, the velum cerebelli, in which in the higher animals the decussation of its root bundles still takes place; and it comes much nearer the trigeminus than the oculomotor nucleus. In the higher fishes the nucleus is already located below the bottom of the fourth ventricle; and much more frontal, nearly back of the oculomotor nucleus, often before the exit of its own root, at a great distance from the trigeminus root.

This is the position in nearly all higher animals. Rarely transition stages are found, between a dorsal position as in the lamprey, and the usual subventricular location of the other animals. A position more or less between the dorsal and subventricular positions is found in *Varanus Salvator*, a desert lizard, and a transition from the caudal to the frontal position of this nucleus is found in some primitive amphibians appearing as a frontal elongation, when the posterior pole remains in its old place, as happens also with the abducens nucleus. Even in man sometimes a caudal remainder of the trochlearis nucleus is found as an isolated symmetric group of cells behind the chief mass.

The dorsal position of the trochlearis nucleus in the cerebellar velum in the lamprey may be the result of the numerous and partly crossing primary and secondary fibers of the equilibrium system there halting, while the subven-

tricular position in the other animals is so that it lies on the posterior longitudinal fasciculus, the same reflex arc which determines in most other animals also the place of the abducens nucleus. That it moves also in the frontal direction is the result of fibers in this bundle, which originate from the roof of the midbrain and supply it in front with light stimuli. These last stimuli are much more important in the higher animals than in the lamprey. This has a poorly developed optic nerve and its tectum opticum is not much more than a simple ependym membrane.

In the sharks and bony fishes this tectum opticum is very strongly developed, and sends a large mass of reflecto fibers backward, also to the nucleus of the oculomotor and trochlearis. This produces also intimate cooperation of the trochlearis with the oculomotor nucleus, so that both groups in some animals can only be separated with difficulty, and in some animals (birds) even shift partly over each other. Therefore, here also are very remarkable nuclei transplacements, which can easily be explained by a tropism, a taxis, dependent on the stimuli which pass thru the functioning nervous system.

The largest of the eye muscle nuclei, that of the oculomotor, shows very important topographic differences, and differences in the relative relation of the groups of nuclei; which can be explained along neurobiotactic lines. The nucleus, which originates in all animals in the midbrain, because it innervates the first head myotome, does not show frontal or caudal displacements of great significance, being from the beginning in the center of the optical system, but rather shiftings in the dorso-ventral plane. It contains only two groups of cells in the lamprey, the frontal part of which lies entirely latero-ventral, directly at the spot where the root leaves the basis of the midbrain. Another part, somewhat more caudal, lies much more dorsal. A ventral oculomotor nucleus is not found in sharks; the entire complex of cells lies above and between the coordinating reflex path of these animals, the

posterior longitudinal fasciculus, the same as the trochlearis and abducens nucleus are grouped along this bundle, which is so mightily developed in the sharks.

As the abducens nucleus in the bony fishes has a very ventral position so also is a part of the oculomotor here shifted ventrally. This lies near the midline; and it is probable that it produces the small number of crossed root-fibers. This ventral displacement went in the direction of the ventral tecto-bulbar paths, collaterals of which can be followed in the nucleus, an influence therefore analogous to that exercised by the tecto-bulbar tracts on the abducens nucleus in these animals. Higher than the fishes the oculomotor nucleus in its entirety lies again in the direct surrounding of the posterior longitudinal fasciculus.

In some amphibia a very primitive distribution is present; in the reptiles it is clearly separated into tolerably sharp groups, and in some representatives of these animals is seen the well circumscribed small cell accessory nucleus of Edinger Westphal; this acquires in birds large proportions, perhaps in connection with the rather strong development of the inner ocular muscles. In general the grouping is strongly pronounced and the crossed rootfibers have become more numerous. The genesis of these crossed root-fibers in birds can be demonstrated to be due to a shifting under the influence of the stimuli, which reach the cells. Crossed germ cells originate thru a migration of neuroblasts thru the raphe.

In the higher mammals the oculomotor nucleus undergoes very particular changes, which are related to the development of binocular vision and the interaction of the convergence and accommodation. The central nuclear group of Perlia, which has to do with the convergence, and lies in the raphe, is seen as a well defined group for the first time in the carnivora, and originates seemingly thru a conglomeration of a part of the root cells of the rectus internus, the convergence muscle. This

group shows a displacement in the frontal direction in the anthropoid apes and especially in man. So that it then lies between the cell groups of Edinger Westphal, which regulate the intrinsic eye muscles and thus the accommodation. We see here clearly demonstrated, that the stimuli which lead to convergence, provoke a correlated complex of reflexes in the nuclei of both recti interni, and also produce a correlated arrangement of the cells, which are associated with that reflex; and thus originates the central convergence nucleus of Perlia, at first caudal in the niveau of the internal rectus nucleus. The frontal displacement which this convergence nucleus successively shows and which causes it in the end to lie in the same niveau as the intrinsic eye-muscles nucleus is the expression of the fact that convergence is correlated with accommodation.

These shiftings and different arrangements of the cells from which the nerves of the ocular muscles originate demonstrate clearly the phenomenon of neurobiotaxis, and demonstrate that the different positions of these nuclei depend on the stimuli which they receive, and that the cells migrate toward the place of the maximal stimulation. Because the eye is originally a photostatic organ which has nothing to do with perception of images and photostatics and gravistatics are the two most important and always correlated space-coordinates of life, it follows that next to the optic reflex fibers the fibers of the equilibrium system have such a remarkable influence on the position of the nuclei of the eye muscles.

As a third determinant the muscle-sense is added, which has a center in the roof of the midbrain.

While in the lamprey the roof of the midbrain apparently is found as sole ending of the optic nerve, in the sharks a lateral cell-group appears in the posterior part of the fore-brain, which is the homologue of the lateral geniculate body. This nucleus, at first small and receiving only a small part of the optic radiation or collaterals, enlarges slowly in the phylogenesis and takes up a con-



stantly increasing part of the optic nerve. So that at the end in man the greatest part of this nerve ends here, and only a smaller part reaches the roof of the midbrain.

In the lamprey a group of cells was found below the anterior margin of the roof of the midbrain, which does not have the lateral location, which we know of the geniculate cells; but the dendrites of which have grown strongly toward the periphery, and have contact with collaterals coming from the opticus, where this passes along the side-face of the forebrain. The lateral optic nerve nucleus is not yet formed but there is a decided contact thru dendrites of still medially situated cells and the formation of an external geniculatum nucleus finds place probably by the cell body following the dendrites, until a nucleus is formed situated against the optic nerve. We have here a new and well studied case of neurobiotaxis. The factors which come in play during the further increase of this nucleus as a terminal station of the optic nerve, and why the roof of the midbrain in itself takes up constantly less fibers, cannot be explained causally.

When an excitation center forms or increases in importance special cells will send out dendrites in the direction of that center or move themselves in that direction.

This is very clear, for instance, in the ventral displacement of the motor nuclei of the jaw and gill muscle in the direction of the gustatory tracts in fishes where the taste sense has reached an important development. These enlarged gustatory systems have not the slightest influence on the nuclei of the ocular muscles. Conversely if, as in the sharks, the posterior longitudinal fasciculus—a tract for optical and vestibular reflexes—enlarges, then the nuclei of the ocular muscles become influenced in their position but not the nuclei of the gill muscles. There is in the displacement of the cells a very distinct selection. Comparative anatomic investigations in lower animals convince, that this selection happens so that outgrowths and displacements

only take place between elements which form a correlative functional connection.

*The peripheric functional correlative connection between ocular muscles and light stimuli, gills and taste; or the relation of the stimuli at the periphery of the body determines and precedes the central fibers' connection.* The neurobiotactic correlation in the central nervous system is a sequence of the relation of the stimuli with respect to the body. Often simultaneous stimuli in or on certain parts of the body of the animal will produce a material connection in the central nervous system. It is not amazing that this postulate was found, as we know since centuries thru psychology, that the correlated (simultaneous) stimuli educate our representative life, and the entire education, thru study, rests for not a small part on association.

The chief law of psychology, the significance of correlated stimuli for the building up of our mentality appears therefore to possess a formative significance; and is at the same time the chief law of the doctrine of neurobiotaxis. What the introspection, the inner experience of human life had taught already for centuries, can also be seen in the anatomic phenomena of that life.

After this law was found for the dendrites and the cell body, it was investigated to see if it also plays a determining role during the growth and the definitive distribution of the effectoric parts of the neurones—the axones—which form the plurality of the longer cerebral tracts. A careful comparison of beginning and end stations of such tracts shows that between these outgrowths a correlative relationship can be demonstrated, that a simultaneous or directly successive excitative condition exists between the region, from where the axon emerges and the region where it shall end; and that the relationship forms the cause for their course and explains a number of peculiarities in the end station of such paths, such as that central motoric tracts as the pyramids, do not stop originally in motor but in sensory re-



gions. It also explains, why no pyramidal fibers from the cortex end in the direct surroundings of the nuclei of the ocular muscles. Sensory posterior roots of the nuclei of the ocular muscles do not exist, and the principal sensory field corresponding with their function is the tectum opticum (anterior corpora quadrigemina) where the cortical efferent fibers for the nuclei of the ocular muscles end.

We learn thus as the chief law of neurobiotaxis, that *all anatomic connections originate between stimulative correlated centers*. Where the tropism of the impression-taking-dendrites goes toward the center of the impressions, thus is stimulo-centripetal, while the course of the axones, conducting further the impression, corresponds with the stimulus-current. The axon does not conduct at first an excitation originating in the nervous system, but on the contrary, this stimulus forms the axon. Young neuroblasts, which lie along the posterior longitudinal fasciculus in the chick embryo, begin only then to send out an axon, when this bundle has reached the level in which they lie. They are activated to send out an axon by this bundle. As this bundle does not touch them, it is clear that the excitations which radiate from the unmyelated axis-cylinders activate them. Herewith corresponds, that the axis-cylinder grows in a direction corresponding with this radiation; that is perpendicular to the fasciculus, and turned away from it, and that the activation takes place corresponding with the direction of growth, that thus the proximal neuroblasts are first and most activated into axonal growth. The perpendicular position of the collaterals is also a sequence. The end point of these new axones or collaterals becomes now determined thru regions stimulatively related to it. Connections of the roots with special muscles groups can be explained in this way. It may be said, that in all processes of neurobiotaxis the time-relation of the peripheric excitations plays a fundamental role, that the formative force proceeds from these excitations, and that the dendrites and later the cell

body grow towards an excitation center, and the axis cylinder away from such a center. This dynamic polarisation of the neuron is difficult to explain.

(We find in the first development of the stimulo-fugal axones the consequence of the anodo-tropic character of its protoplasm furthered by its high alkalichlorid condition; while the much later formation of the dendrites, which take up the stimuli, and the displacement of the perinuclear protoplasm in that direction, is an excitation-seeking tropism which probably becomes stimulated by the formation of the Nissl's bodies.)

The sensitive nerves, the cell shifting of the ganglion of Scarpa in the modiolus, and the peculiarities in the organ of smell are now considered from the neurobiotactic standpoint. . . .

The inward displacement of the placode cells is most evident in the light placode cells and appears very early, directly with the folding in of the cerebral wall. This is not so strange as light is one of the strongest tropistic factors, which can influence even thru the body wall. The light placode—the origin of the neuro-epithelium retinae—will not lose anything of its functional activity as light perceptive organ.

With the folding in of the cerebral vesicle and the growth deep in of the other placodes, we first think of a negative neurobiotaxis. To explain causally the origin of the retina in the cerebral wall, we have to find the reasons, which make a negative neurobiotaxis probable; and to find the correlation which makes the placode cells, when they move deep in, connect just with the cells of the central nervous system, and not with the origin of the eye muscles.

This happens already in *Amphioxus*, whose light cells lie in the spinal marrow. These cells belong to the first, which become invaginated, as they lie in the ventral midline, which folds in the first.

If we consider the fact of the ontogenetic origin of the light placode of

the vertebrates in the cerebral wall from a more general standpoint, then it is not so strange, as the negative tropism, the movement deep in the placode cells, is a general phenomenon, which is in the light placode only more evident than elsewhere. It happens often that later with the outfolding of the ocular vesicle in the direction of the light the negative tropism changes in a positive tropism and it is not strange, as then the skin excludes the direct influence of that medium.

A number of examples exist in the lower organisms, where an original negative tropism by itself—that is thru changes of the metabolism, which are proper to the individual itself—changes to a positive tropism; and in one and the same retina of the higher animals we see alongside of the stimulo-fugal light tropism of the older rods, the stimulo-petal tropism of the more recent cones, and the very strong photopetal tropism of the pigment.

The formation of pigment under the influence of the light is a very general fact. This pigment formation is not restricted to the eye, but is here exceptionally evident; and this in connection with the light perceiving neuroepithelium suggests there is a genetic connection between both these tissues, and that the light sense cells favor the formation of pigment. This is not surprising, as most animals acquire quickly a certain degree of phototropism and direct their eyes in preference toward diffused light.

A second phototropic process seems to favor the peculiar pigmentation of the eye. Light acts in two ways on organisms: directing and attracting or repulsing. Influence of the rays is the most potent factor in the adjustment of the organism; and it is possible to turn away animals, which otherwise seek the strongest light, from the stronger illuminated surface by specially directed rays, when they come in a less illuminated field, notwithstanding their positive phototropic character. An example of this is found in the eye as the orientation of the light perceptive elements takes place there to a great extent according to the rays which touch

it, and it may be that this position of the cells according to the axis of the light is the cause that the tissue situated behind or between these cells undergoes a stronger influence of that light—also for the pigmentation. Not only, therefore, the directing of the eye itself at the light but also the directing of its percipient elements according to that light will be favorable for the pigmentation. It can not surprise, that not only parts of those neuroepithelial cells, as in many invertebrates and some vertebrates, but also of tissue behind these, as the retinal pigment layer of the mammals, and even the choroid, can undergo this influence. It is known that pigment, once formed by the light, also is attracted by the light, is positively phototropic.

A few words about the formation of the human eye. Of the different theories, which try to derive the eye from the lower forms, none is satisfactory. Comparing the eye of molluscs (snails, oysters, inkfishes) and that of the vertebrates, two groups which are certainly not related, we find such a similarity, that we are obliged to consider convergence-phenomena, rather than regular transitions. It is apparent looking for a causal explanation to think of the influence of the tropisms.

Considering the eye we find the outgrowth of a cerebral vesicle, which contains already the light cells on account of the strongly negative tropistic character of the young placode cells. During development the neuroepithelial layer and the posterior wall of the eye approach each other. This must not be considered, as if the ocular vesicle is first a hollow globe, which becomes impressed as a rubber ball into a double walled cup. It is an obsolete opinion to try to find the cause of this approachment in the lens. In eyes without a lens, as those of the Vermes, the neuroepithelium lies also against the pigment cells, as also in the hollow eyes of molluscs as the *Halotis* and *Nautilus*. This proves that the lens is not necessary, as does the fact that in some vertebrates the lens is so small that it does not touch, in any stage of development, the neuroepithelium.



What then must be considered the cause of the approachment of the two walls of the ocular vesicle and what the cause of the growth of this double wall in hollow globe form? One could think of the photopetal character of the pigment, which accompanies a photofugal tropism of the rods, whose movements therefore are turned toward each other. There are however eyes, which contain preponderantly cones, and as the tropism of the cones at least of the myoid is photopetal, such an explanation could not be accepted, unless one surmises that their tropism had been photofugal in a young stage, which can not be excluded a priori, also if one considers the cones to be more developed rods, which, as the neuroblast in its further development, would reverse their tropism. Still another factor could be the influence of the light as position determining factor of the neuroepithelium.

If we accept that in ontogenetically or phylogenetically young animals a rather large part of the skin above the eye was thin and transparent enough to let the light rays through; and that this part becomes limited with a higher development of the skin, then the camera type without lens were present in the ocular *anlage*, as this also is found in the folded-in eye of *Nautilus* and *Haliotis*, and herewith the data for a reversed image-formation which accompanies a divergent direction of the rays.

It is evident that this divergent direction of the rays thru a narrow pupil according to the phenomena of phototaxis must cause a hollow-radial distribution of the neuroepithelium, which again from its side will favor a narrowing of the light-entrance.

This theory, to be correct, must be possible for all those cases where one relatively small, common entrance gives passage to the light for all neuroepithelium cells, thus for monoapertural eyes. This is so. Also according to this opinion no hollow eye will be found in those cases where no common entrance for all rays exists for all neuroepithelial cells, respectively,

where each rhabdome has its own small light entrance, that is in the pluriapertural eye of the insects. The neuroepithelium forms and directs itself according to the course of the rays for each epithelial cell itself, which rays taken in their entirety are in relation to the animal's horizon. The eyes of the insect do not form therefore a bouquet of light tubes, because their basis, the head, is round, but because the vaulted visual field has this form. This also explains why there nearly always exists a rather important incongruity between the forms of their heads and their eyes, which last in most insects is much rounder than the head, the ocular implantation of which being sometimes totally flat.

Although we are far from the understanding of the richness of the surrounding life-forms, and although the results of many years of uninterrupted investigation and thinking are only suppositions, which have to be verified by others, and at their highest only symbols of the truth, still we feel that a mystery of force-lines works around us, which form life and direct it, and which we have to accept not as a wholly passive matter, but as beings in which the immanent equilibrium impulse, the actuality of life with its naturally reasonable correlations is a factor, which steers the body—insect, or man—"to make the best of it," however limited its visual field may be.

I thank you for giving me the opportunity to speak about material phenomena in the nervous system, some known for many centuries as conscious parallelisms as psychologic associations, because we notice them directly in ourselves.

Let us learn from this that this direct conscious experience reveals to us truths about life—more things, and quicker than the external phenomena demonstrates them to us, a truth with which Straub was very much impressed. The tropisms do not help to make us understand polar oppositions in the development of the tissue elements. It is more important that they explain the association, which contrib-



utes that these polar differences remain connected or become connected as one multiunit in rational connection.

Next to the brain no part of the organism shows us more clearly that natural reasonable connection, that logical character of the bodily development, than the eye in its formation and functioning accommodations.

Herewith is illustrated the truth of the saying of Aristotle, the discoverer of the associations and the founder of psychobiology, repeated in different forms by later investigators, "parts of the soul are all found in every one of these bodily divisions; and they are like kind with each other and with the entire soul."

### SHORT ABSTRACTS.

Important points capable of brief presentation are here noticed. The systematic review of current literature is to be found in the Digest of the Literature.

**Maddox, Ernest E.—Close Versus Distant Illumination for Operations.** (Brit. Jour. Ophth., Feb., 1918.) The writer praises highly a small addition to the conjunctival forceps for furnishing illumination during discission of "after cataract," and for emergency night operations. He attaches a tiny electric lamp to one limb of the forceps half an inch from the gripping end, attached with wire, the electricity required being furnished by an ordinary flash lamp. The bulb is so placed that it illuminates the iris brilliantly when the forceps are gripping the limbal conjunctiva, and the grip of the forceps ensures a perfectly steady light and maintains its distance from the cornea. This is better than attaching the lamp to the discission needle, since it is a mistake to attach a lamp to any cutting instrument held by the working hand, because the light not only moves with the instrument, but makes manipulation more cumbrous.

Since, in iridectomies and cataract extractions, the forceps are out of use during part of the operation, Maddox secures the advantages of close illumination in one of three ways: 1, an assistant holds the lamp on the same forceps; 2, the lamp is fastened to a nose-piece clipped on the patient's

nose; 3, the lamp is attached to a thin metal disc fixed by plaster just above the patient's other eyebrow.

The writer contends that, in the absence of a condensing lens, the cornea is more brightly illuminated by a lamp of 2 c.p. at the distance of half an inch than by one of over 1000 c.p. at the distance of a yard, while with a condensing lens, we have to take into account the focusing of the filament on to one spot of the patient's retina by an approximately parallel beam of light which introduces an irritating element into the illumination quite out of proportion to its brightness.

Distant lights may have advantages in large hospitals, but Maddox believes that some form of close illumination has the following advantages: 1, greater economy; 2, greater portability; 3, greater kindliness to the patient's eye, since a close light is diffused widely over his retina with no possibility of the image of the filament being thereon; and 4, increase of the surgeon's visual acuteness, the smallness of the patch of light on the patient's eye causing far less chemical waste in the surgeon's retina than a widespread shine from the whole face and pillow.

C. H. M.

# American Journal of Ophthalmology

Series 3, Vol. 1, No. 7.

July, 1918

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to

H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

## NEUROBIOTAXIS.

A new idea generally requires a new word for its expression. At first it may be conveyed in a clumsy round-about way by unfamiliar and awkward phrases. But when the new term has been coined and used enough to make it familiar, the expression of the idea becomes more clear, direct and brief. The best of such words are built up from those words of older languages that carry related meanings.

*Taxis* means arrangement, or movement toward arrangement. Its most familiar application is to indicate the method of restoring by manipulation, the relation of the parts concerned in hernia. Taxonomy the development of science which embodies the principles of arrangement or classification; and chemotaxis indicating the movement of living cells in response to certain chemical stimuli are other familiar applications of this root word. The modern applications of the old Greek *bios* meaning life, are numerous and in common use. From these roots we get biotaxis, to indicate those arrangements, or movements toward arrangement of parts, that are determined by

vital force. It is a very broad term corresponding in scope to attraction of gravitation or chemical affinity.

*Neuron*, a nerve, is the third root word used to form the term under consideration. In this connection it is well to think of neuron in its modern significance, as the primary unit of the nervous system, a nerve cell with its axon and dendrites, as expounded by Ramon y Cajal. It is used here to limit the term biotaxis to the special phenomena exhibited in the nervous system. From these three Greek roots the word "Neurobiotaxis" is built up. Prof. Kappers' presentation of the idea it was intended to convey at the London International Medical Congress was recognized as of most profound biologic significance and provocative of reflection rather than discussion.

Phototaxis, in a plant or some part of a plant taking a certain position with reference to the light falling on it, has long been recognized in botany; and more recently in zoology, especially in the movement of young fishes and other animals to or from the light. It is a vital manifestation more widely possessed and more primitive than any

form of the nervous system—an extremely important manifestation of the general irritability of living matter. In the higher forms of animals phototaxis is chiefly expressed as a form of neurobiotaxis, but in the original development of a nervous system protoplasmic irritability to light may well have played a part of primary importance.

The value of the conception of neurobiotaxis will be shown by what grows out of it. The location and relation of nerve centers and nerve tracts often seems extremely complex. Those, whose studies of the fundamental medical sciences were pursued chiefly before the modern conceptions of nerve centers had been worked out, find the mastery of these new ideas difficult. The old division of the central nervous system, by its gross external anatomic characteristics, is a serious obstacle to the full command of these later conceptions of it. It would be a real boon to the student to have some scheme of the central nervous system worked out on the basis of neurobiotaxis.

The essential physiologic functions exist in the simplest form of life, long before there is any appearance of any specialized anatomic structures to provide for their performance. It is certain that physiologic need has dominated the phylogenetic development of every organ. A grouping or classification of the various nerve tracts and centers strictly according to their physiologic relations would aid in understanding them and keeping in mind their functional significance. It would probably be quite valuable too as a basis for remembering their topographic anatomy. Kappers has effectively used the relations of the cell groups and nerve tracts concerned with vision to illustrate and support his hypothesis of neurobiotaxis. Who will take neurobiotaxis as a working hypothesis, and on it work out the scheme of anatomic grouping of these tracts and centers?

The gap between such a theoretic hypothesis and the practical questions of ophthalmic practice is not so great as might at first appear. The explana-

tion of the case reported in this journal last month by Schwenk and Posey (see p. 393) rests on neurobiotaxis. The finding of an altered nerve cell in one of the deeper layers of the retina by Feingold (see plate III, Fig. 5) takes added interest when we come to study it in the light of neurobiotaxis. The phenomena of phototaxis and the chemotaxis of nutrition become of the greatest interest for the light they may throw on the internal movements of pigment cells, and their migration in conditions like retinitis pigmentosa and choroiditis.

E. J.

### THE WESTERN MEETINGS.

The meetings at New London this month, and at Chicago last month have given the oculists of the East and Middle West their opportunities for scientific discussion and renewal of personal associations; while keeping in healthy activity one of the most important influences making for professional efficiency, and the cultivation of patriotic enthusiasm. In the West the same opportunities will be afforded to the profession in the meetings at Denver, August 5th and 6th, and in Salt Lake City, August 12th and 13th.

The Colorado Ophthalmological Society will this year be joined by the Colorado Oto-Laryngologic Society in preparation for the Colorado Congress, and the program will include papers and discussions of interest to those practicing along both special lines. One evening will also be given to the subject of reconstruction and reeducation of the disabled soldier or sailor. It cannot be doubted that the success of the meetings already held this year has been due to the spirit of determination to "carry on"; and this determination is equally strong and prevalent in the West.

Some members of the Council of the American Academy of Ophthalmology and Oto-Laryngology had feared it was inadvisable to hold a meeting this year. With the President of the Academy in France, and the Secretary and other members of the Council in military service, and liable to be sent abroad



at any time, such a feeling was not surprising. But the meeting will be held; and the Western members will see that it is a success. As last year the program may be shortened to two days, but the interest and enthusiasm will not be lacking.

The meeting at Salt Lake City will be the farthest East that the Pacific Coast Oto-Ophthalmic Society has ventured. But it is an organization that has proved strikingly successful in gathering together the isolated special workers of the extreme West; and with a President and Secretary residents of the place of meeting, everything will be done to make it a success. The trip between Denver and Salt Lake should be thought of as an added attraction, for those who will have the opportunity to make it; and the summer railway excursion rates from Eastern cities will be available for the whole trip, and as much additional vacation as one may be able to take.

E. J.

### PROPRIETARY DRUG NAMES.

The medical profession has decried "patent medicines." But the registered names under which such drugs are advertised and sold are the property that yields the manufacturers their millions. Such proprietary names are also used for the new synthetic compounds with long unwieldy chemical names that are prescribed by the medical profession. Most of these have from time to time emanated from Germany, with a kind of literature that has proved an effective and profitable variety of propaganda; but which will henceforth be regarded with more skepticism.

The present impossibility of dealing with the German manufacturers of these drugs has forced the United States Government to intervene and recognize other names under which the same drugs are now being sold. The letters of Professor Puckner and Professor Stieglitz, published in this number under "Correspondence," call attention to some of these names under which we can now obtain drugs

of especial importance in ophthalmic practice.

The time is auspicious for breaking away from the habit of using one set of these names that have been helping to draw heavily from the wealth of this country for the benefit of Germany. But a radical change in the laws regarding the proprietary rights attached to the registered names of drugs will be necessary, before the grave evils that have grown up around this practice can be wiped out.

E. J.

### BOOK NOTICES.

**Robert Henry Elliot, Lieut.-Colonel I. M. S. (retired). GLAUCOMA. A Textbook for the Student of Ophthalmology.** London: H. K. Lewis & Co., Ltd. 136, Gower Street, W. C. 1918. Price 21s.

Elliot's monograph, which represents much labor and is written with remarkable clearness and power, should be read by every ophthalmic surgeon. In an introductory chapter it is insisted upon, that the word "glaucoma" is a convenient label for a large group of pathologic conditions, which have in common a rise in the intraocular pressure, upon which every sign and symptom of the disease depends. At the same time Elliot is emphatic upon the point that the glaucomatous process, however different it may appear clinically, is in root one and the same.

Chapter II takes up the subject of intraocular pressure and the tension of the eye. The physical conditions regulating that pressure and the bearing upon intraocular pressure of the continuous flow of fluid which occurs throughout life through the chambers of the eye are considered, together with those changes in the chamber pressure characteristic of certain forms of glaucoma.

He summarizes his conclusions as follows: (1) It is essential to bear in mind that in dealing with the physical conditions which govern the behavior of the intraocular fluid as it passes into and out of the eye, we have to do with

a body of moving water, and that the laws to which we must appeal are those of hydrodynamics, and not those of hydrostatics. (2) There are distinct tho slight differences of pressure at various points in the mass of fluid within the eye; the highest pressure probably lying at the area of production of the fluid, and the lowest, certainly, where it is excreted. (3) The above conclusions are borne out by the teachings both of physiology and of pathology. (4) The question whether the intraocular fluid is poured out by an act of secretion, or by a process of pressure filtration is still undecided. Probably the action is a combined one, pressure and secretory activity each taking a part therein. Fortunately, the interest involved is academic, rather than practical.

As regards the relationship of systemic blood pressure to intraocular pressure it may be said, speaking broadly, that the two rise and fall together. It would nevertheless be a mistake to suppose that the latter servilely follows the vagaries of the former. It is only by giving due weight to this point that we are able to reconcile the contradictory results obtained in experiments with amyl nitrit, adrenalin, strophanthus, and some other drugs. Elliot throws out the suggestion that in trying to estimate the importance of the part played by increased intraocular blood pressure, in affecting the pressure of the intraocular fluid, "we must look to the venous and not to the arterial end of the system." The author's conclusions as regards the systemic blood pressure and the intraocular pressure, and the relation between the intraocular blood pressure and the intraocular fluid pressure outside the vessels, are as follows:

(1) Whilst the systemic blood pressure tends, as it rises and falls, to exert a corresponding influence upon the intraocular pressure, this influence may be masked, or even wholly neutralized, by a number of other factors. (2) The high blood pressure of general arteriosclerosis is not necessarily, or even usually, associated with a high intraocular pressure, and is emphatic-

ally not a factor in the causation of glaucoma. (3) The venous exit-pressure thruout the eye must always be a little in excess of the intraocular pressure, if the circulation of blood is to be maintained. It is therefore very difficult to assume that the pressure in Schlemm's canal can be below that of the intraocular pressure, and that the channel is held open against a negative pressure by the rigidity of the structures which surround it, unless the same assumption is extended also to the veins which lead out from it. (4) It seems probable that osmotic action plays a large part in the transference of fluid from the anterior chamber into the canal of Schlemm and the iris veins, and that this action is strongly reinforced during the waking hours by the pump action described by Professor Arthur Thomson. The author, by the way, gives considerable prominence to the last named theory.

A chapter of upwards of sixty pages is devoted to the etiology of glaucoma. The author's endeavor has been to deal with the subject clearly, giving to each worker the fullest credit, but showing favor to no one. Priestley Smith's views are accorded the utmost deference. A feature of this chapter and of some others are the microphotographs taken by Mrs. Elliot. All the factors which have from time to time been cited as causes of glaucoma may ultimately be classified under one or other of two headings: (1) Those which influence the balance of secretion and excretion of the intraocular fluid, and (2) those which directly or indirectly determine a change in the vascular conditions within the eye.

Speaking of the pathologic anatomy Elliot does not lay any great stress upon the changes in the vortex veins described by Birnbacher and Czermak, and he regards evidences of vascular disease generally as more likely to be the result rather than as the cause of an increase of intraocular pressure. As to the cavernous atrophy of the optic nerve described by Schnabel, he points out (1) that it is met with in eyes that have never been subject to an increase in internal pressure, and (2) that no



signs of its existence are to be found in many, if not in most, glaucomatous globes. The most important piece of evidence that glaucomatous cupping is due to increased intraocular pressure lies in the fact, pointed out by Holth, Axenfeld, and Butler, that after the reduction of ocular tension by means of operation, the glaucoma cup may level up or completely disappear. In this connection it may be noted, too, that Lange has seen a diminution in the depth of glaucoma cups after the employment of miotics.

Fibrosis of the pectinate ligament as a factor in causation may be one of the causes predisposing to glaucoma, since it may tend to upset the balance normally held between the secretion and the excretion of fluid from the eye. Beyond this cautious statement Elliot is evidently not prepared to go. To Fischer's theory of the production of glaucoma by the action of acids or alkalies on the tissues of the eye Elliot opposes the fact that no anatomic evidence has yet been brought forward to prove such a change (edema) as he assumes. Neither has the result of treatment based on Fischer's theory always proved successful. In discussing the part played by closure of the filtration angle, the work of Leber, Knies, and Weber is spoken of, and a handsome tribute is paid to that of our own countryman Priestley Smith.

Chapter IV deals with the diagnosis of glaucoma. It insists upon the importance of a surgeon being on his guard; and teaches that while great difficulties undoubtedly occur, the majority of cases of glaucoma are readily diagnosed. Elliot considers that the term prodromata of glaucoma is a bad one, and that from the moment the earliest premonitory signs appear the eye should be regarded as definitely glaucomatous.

There are objections to the use of the term "absolute" as applied to glaucoma. For the purposes of the present book it was decided to adopt a classification into: (1) early glaucoma, (2) established glaucoma, and (3) late glaucoma. The scheme is at least useful, expressive, and logical. The signs

and symptoms of glaucoma as it affects each structure of the eye are taken up in turn. On page 165 Elliot figures a very ingenious paper folding device intended to explain the edge of a glaucoma cup and the apparent alteration in the direction of the vessels as they emerge on the plane of the retina. The device should be found useful by students, who often misunderstand the apparent discontinuity in the course of the vascular trunks.

A most important section of chapter IV deals with the visual field in glaucoma, in the course of which the advantages and disadvantages of large and small test objects are discussed. To employ large objects is of no advantage, since it does not increase the size of the field, whilst it lessens the accuracy of the observations made. By reducing the dimensions of the object, we find that even in normal subjects the size of the field mapped out is considerably reduced, until when working with a 1 mm. object at a distance of 2 m. the field extends to about 20 mm. all round. From such a chart features of great value may be gathered which do not appear if a larger object be employed.

Elliot employs Sinclair's useful method of stating the size of an object as the numerator of a fraction, the denominator of which denotes the distance of the eye from the perimeter, and he insists that in all perimetric work it is necessary to state the size of the object, the distance of the eye from that object, and the illumination and the color of the object. Elliot thinks that the best results may possibly be secured in the end by the adoption of the electric-lit instruments. In connection with the distribution of the nerve fibre bundles on the retina, and its bearing on glaucomatous field defects we draw special attention to the original diagrams Nos. 29, 30, and 39. The study of these diagrams is most helpful. This section abounds with illustrations and those of Roenne, van der Hoeve, Bjerrum, and Sinclair are freely drawn upon to supplement the writer's own charts.



Elliot describes a new scotometer, and takes the opportunity of figuring a novel perimetric sign of glaucoma, which may be a development of Seidel's well known sign. On the assumption that Seidel's sign is due to an injury to the fibers of the optic nerve, either on the disc or at its edge, it has always seemed curious to Elliot that the scotoma in question should be described as ending in a pointed or rounded single extremity. It seemed more reasonable to assume that the peripheral limits of the scotoma would end not in one point but in several. This has been found to be the case when early glaucomatous eyes were examined with the author's new scotometer. Readings, however, must be taken all round the circle, at each point from  $1^\circ$  from the center out to  $26^\circ$ . After the relief of tension by surgical means the scotoma is much reduced in size, although its peripheral limits still possess a more or less ragged edge. The sign now described by Elliot may prove to possess considerable diagnostic value.

Speaking of the Schiötz tonometer Elliot says that "the feeling of those who work with it is that one might just as well guess a patient's temperature by passing a hand over his skin as attempt to estimate his ocular tension by the digital method alone." In using the instrument the author prefers to have the patient lying flat upon a bed, or on a comfortable couch, and in such a position that it is difficult for him to drop the chin. Before application the foot plate of the tonometer should be sterilized in absolute alcohol and dipped into warm water. In order to avoid the danger of corneal abrasion a drop of sterilized liquid paraffin should be used, and in all nervous patients local anesthesia should be secured by a drop of holocain, 2%. The eye should be fixed by looking at an object immediately above the couch. One application of the instrument made with care should usually suffice. The tonometer should be applied vertically, its footplate should rest as nearly as possible on the center of the

cornea, and never on the sclero-corneal junction.

Elliot concludes that "though the Schiötz tonometer does not necessarily record the exact intraocular pressure given to Cridland's views as to its rather wide range. In brief, Elliot thinks it probably goes very near to doing so in the great majority of ordinary cases. The comparative readings which it furnishes of any one eye at different periods and under different conditions are absolutely reliable. Again, the instrument may be depended upon to detect with certainty very small differences between the pressures of the two eyes of the same person." The writer agrees with Priestley Smith in thinking that the actual reading given by the instrument should be recorded, and not the supposed equivalent in mm. of mercury.

In discussing the limits of the normal intraocular pressure prominence is given to Cridland's views. In brief, Elliot thinks that the great value of the Schiötz tonometer lies in watching the progress of a case and in observing the effect of the means employed to combat the rise of intraocular pressure. The author appears to believe that the examination of the light sense (for which purpose he has devised a special apparatus), may prove a fruitful field in the future, altho he is far from being dogmatic on the subject.

Altogether, Elliot has covered the diagnosis of glaucoma in a most satisfactory way. Running all thru the chapter is the insistence upon the need of taking a broad view of each case; and never being led into the mistake of forming a judgment upon one sign or symptom alone, however important that particular item may seem to be. When in doubt after a survey of all the evidence available, the surgeon's attitude should be one of watchful waiting.

The chapter which deals with congenital glaucoma and some allied conditions, as juvenile glaucoma, is most interesting. Once again Elliot insists upon the essential unity of all forms of glaucoma. If it were possible to judge all cases in the light afforded by full anatomico-pathologic knowledge, which is unfortunately not the case, we could

scientifically classify glaucomas into: (1) the congenital, i. e., those due to prenatal defects in the normal development of the excretory passages of the eye; (2) those in which the degenerative processes associated with senility play the leading part; and (3) those in which the anatomic configuration of the eye is such as to pave the way for the onset of glaucoma, with a minimum of assistance from the processes of senile degeneration. As to buphthalmos it probably always dates from birth, altho slight cases may not be recognized until later in life; so that not a few instances of so-called juvenile glaucoma are really of buphthalmic origin.

The signs and symptoms of buphthalmos are carefully described. Speaking of the tension of such eyes Elliot points out that owing to alteration in the curvature of the cornea, the Schiötz tonometer is unsuitable for recording the intraocular pressure. He comments upon the fact that in buphthalmos the myopia present is very moderate in amount. In the majority of cases the disease is due to a persistent fetal condition of the angle of the anterior chamber, as maintained by Collins and others. In a smaller number of cases intrauterine inflammation is responsible for the condition. It is probable, says Elliot, "that the main factor is the tendency to reffective development, and that disease plays a subsidiary and comparatively infrequent part" (p. 338).

Megalocornea is regarded by the author as an instance of infantile glaucoma that has undergone arrest before permanent damage has been inflicted upon the eye. With regard to the treatment of buphthalmos a resumé is given of the subject and stress is laid upon the fact that whatever the nature of the treatment it should be begun early. The author has had some encouraging results from trephining, altho he is far from claiming invariable success from that or any other operation. In operating upon these difficult cases he points out certain technical matters, of which one is that the usual step of slitting the cornea is not needed. The

essential factor of success, whatever operation be adopted, lies in the production of a filtering scar. The possible influence of congenital syphilis in buphthalmos must be borne in mind.

Chapter VII is devoted to a discussion of the medical treatment of glaucoma, taking up separately in the same chapter prophylaxis, the treatment of an established condition of simple glaucoma and of an attack of congestive glaucoma. In regard to the medical treatment of glaucoma the various means at our disposal are discussed, special stress being laid upon the employment of miotics, and of various kinds of massage. De Wecker's striking aphorism is quoted: "If miotics have never cured a case of glaucoma they have prevented many glaucomatous patients from being cured." If despite medical measures the disease progresses, Elliot is convinced that we should resort without further delay to surgical means for the production of a fistulous scar.

Chapter VIII deals with iridectomy in glaucoma, the first section being devoted to the opinions of the old masters and the second to those of more modern writers. In order to account for the curious discrepancy of view as to the value of the operation in glaucoma several points must be considered; such as the confusion in terminology, the different periods at which iridectomy is undertaken, and the technic of the operation. With reference to the last point Elliot claims that the "man who can perform iridectomy in congestive glaucoma easily, smoothly, and safely is a pastmaster of his art." Another important point in judging the effect of iridectomy in glaucoma has to do with the period during which the cases are followed after operation.

A glaucomatous process may be definitely checked by operation yet the surgeon's aim may be defeated by a progressive atrophy of the optic nerve, and in connection with this Elliot throws out the valuable suggestion that we should in all such cases seek out and treat all possible causes of auto-infection, inasmuch as a nerve damaged by intraocular pressure may be



liable to fall a ready prey to any toxic influence which it would under other and happier conditions have readily overcome. After pointing to the various ways in which an iridectomy reduces the tension of a glaucomatous eye, Elliot makes the point that in the newer operations we are dealing with an entirely different set of conditions; since the aim is not to reopen old physiologic channels, but to form a new and vicarious conduit for the escape of the aqueous. In those operations, he thinks, there can "be no question that a fistula can be established long after the time is past when an iridectomy would be of any avail." Again, arguments for the importance of early operation in iridectomy do not tell so much when dealing with the newer operations, although even under those circumstances the point is not to be belittled.

The author reaches the following conclusions: (1) If an operation for glaucoma is to be undertaken, the earlier it is performed the better is the result likely to be; therefore, it is important to make up one's mind on the subject at the earliest possible moment. (2) Every case of glaucoma in which operation is postponed should be watched with the utmost care, and the moment that medical treatment fails to hold it in check, surgery should be resorted to without delay. (3) Special watch should be kept on (a) the condition of the visual field, (b) the tension and (c) the visual acuity. A departure from the normal in all three or in any one of them and especially in the visual field calls for a decompression operation. (4) Iridectomy, undertaken with the deliberate intention of freeing the natural channels of excretion and so of restoring the *status quo ante* should only be resorted to in those early cases in which there is reason to believe that such a feat is possible. Once plastic inflammation has blocked the angle of the chamber, this rôle of the procedure ceases. (5) When it is recognized that the attainment of decompression depends on the opening up of various filtration channels, the obvious call is for one of the newer

operations. The fact that an iridectomy or a sclerotomy may be followed by the formation of a filtration scar is beside the point. We should deliberately undertake a well planned procedure which aims at the formation of the kind of scar we desire to produce. Any other line of action is bad surgery, since it lacks consistency and clarity of purpose. (6) Each surgeon must be guided not only by the environment of his patients but also by his own idiosyncrasies. (7) Each case must be considered on its own merits. The relative prospects of life and of remaining months or years of sight must be carefully weighed. Against the admitted dangers of operating must be set the inexorable progress and the appalling results of the disease. (8) Statistics are wanted both of success and of failure.

In bringing this notice to an end we congratulate Lieut.-Colonel Elliot upon having produced a noteworthy book in which the manifold problems of glaucoma are discussed in a broad-minded and logical way and in a thoroughly scientific spirit. It marks an epoch in the history of glaucoma.

SYDNEY STEPHENSON.

## CORRESPONDENCE.

### The British Society Meeting.

*To the Editor:* The 38th Annual Congress of the Ophthalmological Society of the United Kingdom met under the Presidentship of Mr. E. Treacher Collins, at the Royal Society of Medicine, London, from May the 2nd to the 4th, 1918.

The Proceedings were opened by the President's address, in the course of which he reviewed the work of the past year, and announced that "the Bowman Lecture would be delivered by our friend and ally, Professor Morax," and that the Nettleship gold medal for the year had been awarded for the first time to a physician, Dr. Gordon Holmes, in recognition of his work in connection with War Injuries of the Visual Centres.

The President then read a very valuable paper on "An experimental investigation as to some of the effects of



hypotony in rabbits' eyes." He had got Lt.-Col. Kirkpatrick in Madras to carry out the necessary procedures, and to send the eyes home ready for cutting. In some of the eyes the anterior chamber had been tapped, whilst in others the vitreous chamber had been trephined. At various short periods thereafter, the animals had been killed, and the eyes suitably prepared for sectioning. The most interesting feature in a paper full of suggestions was, that the situation and nature of the exudate varied according to the cavity, which had been opened. An interesting discussion ensued. (The papers then read are noticed under "Society Proceedings," p. 501.)

Mr. Freeland Fergus' paper on "Vision and Work" was taken as read in his absence. Excellent discussions followed the readings of the papers.

The afternoon was taken up with the discussion of "Plastic operations of the eyelids." This was opened in a very able and interesting paper by Major Gillies, R. A. M. C., from the Sidcup hospital, the work of which has become so famous. Messrs. Higgins and Harrison Butler followed him, and then a number of other surgeons took part. An important feature of the afternoon's work was the exhibition before the meeting commenced of illustrative cases and of models. The other business of the afternoon was the report of the Committee on "The conditions affecting the standards of vision in the British Army." Then followed the business meeting of the Society.

The official dinner at the Welbeck Palace Hotel in the evening was well attended, and was a very cheery function.

The following morning (May 3rd) the members of the Congress went down to visit the Metropolitan Asylums Board Ophthalmia School at Swanley in Kent, as the guests of the President; and spent a most enjoyable and profitable morning in going round these model schools and in seeing the working of the Institution. A discussion was held on the spot on "Contagious Diseases of the Conjunctiva." The Secretary read a very instructive com-

munication by Major J. F. Cunningham and Capt. J. Wharton, R. A. M. C., on the work that had been done on this subject in connection with the Chinese and Egyptian labor battalions in France. The President then contributed a short but interesting paper on the work of the Ophthalmia Schools, and Mr. Mayou dealt with the pathology of trachoma, illustrating his subject by colored drawings. A good discussion followed in which a number of members took part.

After lunching with the President, the members returned to London and visited the Museum of the Royal College of Surgeons, where Col. W. T. Lister exhibited a large and most beautiful collection of specimens illustrating war injuries of the eye. The Congress reassembled in the evening at the Royal Society of Medicine, when a number of cases were shown, and papers were read.

On Saturday, May 4th, the place of meeting was at the National Hospital for Paralysis, Queen's Square, where a clinical meeting was held, and papers were read by Dr. Kinnier Wilson, Dr. James Taylor, and Mr. L. Paton.

An invitation to attend the Congress had been sent by the President to all medical officers serving with the American and Canadian Armies in Europe. Very few of them were able to attend; but those who did were made heartily welcome. Mr. Collins and the officers of the Society are to be heartily congratulated on the results of their efforts. It is no small achievement to hold any form of congress at the present time. They not merely held one, but made it a great success. Mr. J. B. Story of Dublin has been elected President for the coming term of office.

R. H. ELLIOT,  
Lt.-Col., I. M. S., Rtd.

### BLUE CATARACT.

*To the Editor:* I was glad to see a translation of the Blue Cataract paper in the last number of the journal. You may recall that I reported several of these cases in the *Ophthalmic Record* in 1913, under the title of "Unusual Types of Punctate Cataracts," but unfortunately in

the reference to this article in the Year Book of that year, page 193, no mention was made of my allusion to the greenish color of the opacities. I know that when I attempted to look up the American literature on this subject, I failed to find any that was satisfactory.

Yours very truly,

T. B. HOLLOWAY.

Philadelphia, Pa.

### **Names of Synthetic Drugs**

*To the Editor:* Professor Stieglitz, Chairman of the Subcommittee on Synthetic Drugs of the National Research Council, has asked me to send you the enclosed letter for publication. (See below.)

On behalf of the Committee, he also urges that you adopt the Federal Trade Commission's recommendation to use the official name of the licensed drugs in connection with all written articles and advertisements, and if the proprietary brand name is to be used, to place this side by side with the official name.

The official names so far adopted by the Federal Trade Commission are:

Arsphenamin for the drug marketed as: Salvarsan, Diarsenol and Arsenobenzol, etc.

Neoarsphenamin for the drug marketed as: Neosalvarsan, Neodiarsenol and Novarsenobenzol, etc.

Barbital for the drug marketed as Veronal.

Barbital-Sodium for the drug marketed as Medinal and Veronal-Sodium.

Procain for the drug marketed as Novocain.

Procain Nitrate for the drug marketed as Novocain Nitrate.

Phenylcinchoninic acid for the drug marketed as Atophan.

Yours truly,

W. A. PUCKNER.

Chicago.

### **Procain and Novocain Identical**

*To the Editor:* It appears that in certain quarters the attitude is taken that the local anesthetic sold as Procain is not identical with that marketed as Novocain. The Subcommittee on Synthetic Drugs of the National Research Council believes it important that this mis-

understanding should be corrected and hence offers the following explanation:

The monohydrochlorid of para-amino-benzoyldiethyl-amino-ethanol, which was formerly made in Germany by the Farbwerke, vorm. Meister, Lucius and Bruening, Hoechst A. M., and sold under the trademarked name Novocain, is now manufactured in the United States. Under the provisions of the Trading with the Enemy Act, the Federal Trade Commission has taken over the patent that gave monopoly for the manufacture and sale of the local anesthetic to the German corporation, and has issued licenses to American concerns for the manufacture of the product. This license makes it a condition that the product first introduced under the proprietary name "Novocain" shall be called Procain, and that it shall in every way be the same as the article formerly obtained from Germany. To insure this identity with the German Novocain, the Federal Trade Commission has submitted the product of each firm licensed, to the A. M. A. Chemical Laboratory to establish its chemical identity and purity, and to the Cornell pharmacologist, Dr. R. A. Hatcher, to determine that it was not unduly toxic.

So far, the following firms have been licensed to manufacture and sell Procain:

The Abbott Laboratories, Ravenswood, Chicago.

Farbwerke-Hoechst Company, New York, N. Y.

Rector Chemical Co., Inc., New York, N. Y.

Calco Chemical Company, Bound Brook, N. J.

In conclusion: Procain is identical with the substance first introduced as Novocain. In the interest of rational nomenclature, the first term should be used in prescriptions and scientific contributions. If it is deemed necessary to designate the product of a particular firm, this may be done by writing Procain-Abbott, Procain-Rector, or Procain-Farbwerke or Procain (Novocain brand). Yours, truly,

JULIUS STIEGLITZ.



# NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. As these columns go to press on the 30th of the month contributors should send in their items by the 25th. The following gentlemen have consented to supply the News Item Editor with the news from their respective sections: Dr. James A. Black, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. A. E. Davis, New York City; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. George F. Keiper, La Fayette, Indiana; Dr. George H. Kress, Los Angeles; Dr. W. Holbrook Lowell, Boston; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. Geo. M. Waldeck, Detroit; Dr. Oscar Wilkinson, Washington. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered as well as all foreign countries. Volunteers are therefore needed and it is hoped that they will respond promptly to this call.

## DEATHS.

Dr. Addison F. Sanders, Cincinnati, was killed on May 5th by being struck by an automobile.

Neil J. Hepburn, aged 71, of New York City, died at his home May 28th.

Lt. Col. Frank C. Todd, formerly Prof. of Ophthalmology in the University of Minnesota, died July 4th at the Presbyterian Hospital, Chicago, from double pneumonia contracted while engaged on inspection duty.

## CORRECTION.

Lieutenant J. W. Thompson, of Pueblo, Colorado, should have been on the honor list of ophthalmologists now in the service.

## COMING MEETINGS.

Colorado Ophthalmological Congress, Denver, Colorado, August fifth and sixth.

Pacific Coast Oto-Ophthalmological Society, Salt Lake City, August twelfth and thirteenth.

## PERSONALS.

Dr. J. P. McCullough, ophthalmologist and aurist to the British Forces from 1915-17, has opened an office in Toronto, Canada.

Col. W. T. Lister delivered the Hunterian Lecture on May 8th, on the subject of "Pathologic Aspect of Certain War Injuries of the Eye."

Dr. S. Lewis Ziegler of Philadelphia, at the recent meeting of the Alumni of the Medical Department of the University of Pennsylvania, was elected President for 1918.

Dr. Harold C. Goldberg, of Philadelphia, has been appointed Ophthalmic Surgeon to the American International Ship Building Corporation of the Emergency Fleet located at Hog Island.

Dr. E. Velter, Chief of the Laboratory of Clinical Ophthalmology of the Paris Faculty of Medicine, has been awarded the Chateau-Villard prize for his work on war surgery. "Penetrating Wounds of the Head by War Projectiles." This article had already received the Godard prize for 1917 of the Academy of Medicine.

Dr. D. F. Harbridge, of Phoenix, Arizona, has been elected Secretary of the Arizona State Medical Association. Dr. Harbridge was one of the delegates to the Conference of State Secretaries held in Chicago, at the call of the A. M. A., to supply medical officers for the Army, the immediate need being 5,000 doctors.

Dr. Clarence Loeb has been appointed Associate in the Eye Department of the Michael Reese Hospital, Chicago.

## SOCIETIES.

Three candidates presented themselves for examination before the American Board of Ophthalmologic Examinations, in Chicago, on June 10th. Because of his confining duties in the Government service, Dr. Todd has resigned as Secretary of the Board, and Dr. Wilder was elected to succeed him.

The Chicago Ophthalmological Society gave a dinner on the evening of June 11th in honor of the visiting guests of the American Medical Association. Among the distinguished out-of-town visitors who responded to toasts were Doctors Howe of Buffalo; Zentmayer, DeSchweinitz, and Holloway, of Philadelphia; Weeks and Thompson, of New York; Calhoun, of Atlanta, and Parker, of Detroit.

At a representative meeting of ophthalmologists at the Royal Society of Medicine, it was decided to form a council to take action in matters of ophthalmologic interest in connection with public affairs. It was decided that the Council should consist of all the past and present presidents of the Ophthalmological Society of the United Kingdom, and the Section of Ophthalmology of the Royal Society of Medicine as permanent members, four members nominated annually by the councils of each of these societies, and one representative from the Oxford Ophthalmological Congress.

The Mexican Ophthalmological Society has decided to publish its own annals, and the *Anales de la Sociedad Oftalmologica Mexicana* has already made its appearance. Dr. D. M. Velez is its director and the perpetual secretary of the Society. Summaries of the two leading articles are given in both English and French, and duplicates are published on an insert for convenience of reviewers. The officers of the Society for 1918 include Dr. F. Lopez, president; Dr. A. Chacon, vice-president, and Dr. E. F. Montano, perpetual treasurer.

At a recent meeting of the American Medical Association in Chicago, the Ophthalmological Section was, as usual, one of the best attended sections of the meeting, there being 407 registrants. The Chairman, Dr. Duane, of New York, was unable to be present. The vice-chairman, Dr. Calhoun, of Atlanta, presided.

One of the striking features of this section is that there are few attempts to speak other than to the question. Rambling discussions that have nothing to commend them are rarely



heard. The Section met in the ball-room of the La Salle Hotel. The room was much too large and the acoustic properties were bad. This feature is so important that it should be most carefully considered in each instance. The newly elected officers were, C. D. Westcott, Chairman; Thos. B. Holloway, Vice Chairman; E. S. Thompson, Secretary; W. B. Lancaster, Delegate; E. H. Cary, Alternate; Edward Jackson, Member of American Board for Ophthalmic Examination. The next meeting will be at Atlantic City.

#### MILITARY NOTES.

Charles W. Kollock, M. R. C., of Charleston, S. C., who was commissioned September 18th, 1917, is in charge of the Aviation Unit, Charleston, S. C.

Dr. James A. Smith of Chicago has been commissioned a First Lieutenant in the Medical Reserve Corps, and is waiting to be called to active duty.

Capt. Francis Lane of Chicago, who has been in charge of the ophthalmologic department at the base hospital, Camp Grant, has been obliged on account of ill health to retire from the Government service. He intends to resume his private practice as soon as possible.

The following ophthalmologists have been transferred from the M. R. C. to the National Army in order that higher ranks might be conferred upon them: Theodore Lyster, Brig. General, Aviation; Walter R. Parker, Colonel, N. A.; George E. de Schweinitz, Edward C. Ellett, Frank Todd, James Bordley, Jr., Nelson Nelson M. Black, Casey A. Wood, and Allen Greenwood have all been made Lieutenant Colonels in the National Army.

The *British Medical Journal* describes the ophthalmic motor ambulance given to the Italian army by the group of American poets. It was designed by Professor Busi of Bologna and Major Balestra, and the whole packs into a trolley of the dimensions required by the railway authorities. It provides a small operating room with wooden walls and roof covered with impermeable canvas, and a waterproof tent mounted on iron frames with rain-proof roof. This forms the reception room and also on occasion a radiologic cabinet and ophthalmoscopic examination room when it is covered inside with black cloth. The *Riforma Medica* states that the ambulance has been completed and has already left for the front in charge of Major Alfonso Neushuler.

#### MISCELLANEOUS.

The Association Valentin Häuy pour le Bien des aveugles, 9, rue Duroc, Paris, has offered a prize of 1,000 francs for the best apparatus which enables the blind to read temperatures.

Members of the Hempstead Academy of Medicine, Portsmouth, Ohio, are petitioning the State Health Department for an appropriation to establish a Federal and State Trachoma Hospital in Portsmouth.

The Eleventh Annual Report of the Massachusetts Commission for the Blind has been submitted for the year 1917. The number

registered during the year amounted to 2,007; special service being rendered to 1,046.

A number of acute illnesses marked by ophthalmoplegia and other symptoms suggestive of botulism have occurred in London and in other parts of Great Britain. The cases are featured by double third nerve paralysis with ptosis and diplopia. Pyrexia and delirium have been present in most cases. The source of infection is obscure but is due to some kind of infected food.

The Hospitalstidende quotes a German exchange to the effect that an institution was organized in 1917 in Germany to train dogs to serve as guides for the blind. Dr. Bauer is in charge of the work, and he recently exhibited five dogs that had finished their training. They not only serve as guides but warn the blind man they are leading of every obstacle, watch out for anything he may drop, and, in short, it is said, serve as a friend and protector as well as a guide.

#### OPTICAL GLASS MADE IN AMERICA.

Ophthalmologists who have known something of the serious shortage of optical glass in this country will be interested in knowing how the situation has been met. The War Industries Board now authorizes publication of the following facts:

Optical glass, although not required in large quantities, is an item in war operations which is important because much of the firing, especially of artillery, is directed by optical instruments. If the men are not equipped with adequate fire-control instruments or can not see to aim properly, their firing can serve little purpose. A field army or a battleship without field glasses, telescopes, and other optical instruments is manifestly placed at a serious disadvantage.

Before the war little effort was made to produce optical glass in the United States. Manufacturers of optical instruments were able to obtain optical glass in desired quantity and quality from Europe and consequently did not feel the necessity for making it themselves. In 1912, however, the Bausch & Lomb Optical Co., of Rochester, N. Y., built an experimental optical glass plant and placed a practical glassmaker in charge; by 1914 this company was able to produce a few types of optical glass which were used in optical instruments.

By the end of 1914 the importation of optical glass had become difficult and uncertain. Other firms, as Keuffel & Esser, of Hoboken, N. J., and Spencer Lens Co., Buffalo, N. Y., and the Bureau of Standards of the Department of Commerce, at Washington, began to experiment in making optical glass. By 1917, when the United States entered the war, the optical glass situation had become critical. The European supply was practically cut off. Optical glass had to be made in this country if our Army and Navy were to receive the fire-control instruments which they needed.

The geophysical laboratory of the Carnegie Institution of Washington was called upon

to aid in the production of high grade optical glass. A party from the laboratory was stationed at the plant of the Bausch & Lomb Optical Company in April, 1917, and for seven months all efforts of the laboratory were concentrated at this plant. At the end of 1917 the essential details of the manufacture had been developed and glass in considerable quantities was being produced. The efforts of the laboratory were then extended to the Spencer Lens Company and to the Pittsburgh Plate Glass Company, Pittsburgh, Pa. During this period the Bureau of Standards rendered effective aid.

At the present time, as a result of cooperation between the manufacturers and scientists, large quantities of optical glass of the kinds needed for military fire-control instruments are being produced, and of a quality equal in practically every respect to the best European glass. The need for a continuance and assured supply of optical glass is so great that the workmen trained in the details of manufacture and subject to draft, are being withheld from draft, in order that their technical training may be utilized at this time. The required information and details of manufacture and the skill necessary for proper production have been gained at great expense and under high pressure.—*Official Bulletin War Dept., Friday, June 21, '18.*

#### DINNER TO DR. SAMUEL D. RISLEY.

Dr. Samuel D. Risley, the nestor of American Ophthalmology, after a notable career as professor and author has discontinued public work and will henceforth devote himself to the exacting demands of his private practice.

The occasion of Dr. Risley's retirement from Wills Hospital Staff—after twenty-seven years of unbroken service—marked an important epoch in American Ophthalmology, and was made the occasion of a testimonial dinner which was confined to ophthalmologists of the city of Philadelphia and the state of Pennsylvania, with a group of notable representative men of other branches of medicine and surgery.

The dinner was held at the Union League of Philadelphia, the committee in charge being Dr. Howard F. Hansell, Dr. William Campbell Posey and Dr. G. Oram Ring.

Dr. G. Oram Ring, a former student of Dr. Risley, acted as toastmaster and made appropriate reference to the honored guest, as author, teacher, companion and friend.

A letter was read from Major George E. de Schweinitz, who was prevented from being present by his work in connection with the Chairmanship of the Ophthalmological Section of the Council of National Defense. I quote a sentence from a letter of Major de Schweinitz read at the dinner:

"He steadied my feet when first they stepped into ophthalmic pathways, and because of his wisdom, advice and sterling example I have tried to walk straight. During many a trying hour, such as must come to all men who deal with the delicate and difficult problems of our profession, he has been my support and comfort, and he has never failed me as teacher, colleague, friend and exemplar. I am deeply grateful and proud withal that this debt is mine."

Dr. Charles K. Mills, a contemporary and life long friend of Dr. Risley, Professor of Neurology, University of Pennsylvania, spoke from the theme, "The Days of Auld Lang Syne."

Ex-Governor Edwin S. Stuart, as President of the Board of City Trusts, having in charge Wills Hospital, paid Dr. Risley an eloquent tribute in connection with his rare skill and devotion to the charitable work of the institution.

Dr. E. E. Montgomery, Professor Emeritus of Gynecology, of Jefferson Medical College, spoke upon the theme, "The Winter of Life."

Dr. P. N. K. Schwenk, as President of the Surgical Staff of the Wills Hospital, represented that body of Dr. Risley's colleagues.

Dr. Howard F. Hansell, Professor of Ophthalmology of Jefferson Medical College, represented the College of Physicians, of Philadelphia.

Dr. John B. Beaver, Professor of Surgery of the University of Pennsylvania, represented his branch of the profession.

Dr. T. Chalmers Fulton, spoke for the Medical Club of Philadelphia and paid a glowing tribute to Dr. Risley's administration as President of the Club.

Dr. William Campbell Posey on behalf of the guests presented Dr. Risley with a loving cup and paid a striking tribute to his work, particularly that on "School Hygiene."

G. O. R.



# OPHTHALMIC LITERATURE.

Under this head continuing the "Index of Ophthalmology" heretofore published in **Ophthalmic Literature** will be found the subjects of all published papers received during the last month, that bear to an important extent upon ophthalmology. The subject is indicated rather than the exact title given by the author. Where the original title has been in a foreign language it is translated into English. The journal in which the paper is published will indicate the language of the original.

The names of the different journals are indicated by abbreviations which generally correspond to those used by the **Index Medicus**, the **Journal of the American Medical Association**, and the **British Journal of Ophthalmology**. We will from time to time publish the list of ophthalmic journals, with the abbreviations used for each. Often a single letter discriminates between journals published in different languages. Thus "Arch. of Ophth." refers to the Archives of Ophthalmology, published in English; "Arch. d'Ophth." indicates the French Archives d'Ophthalmologie; "Arch. de Oftal." refers to the Archivos de Oftalmologia Hispano-Americanos, while "Arch. di Ottal." indicates the Italian Archivio di Ottalmologia.

In this index of the literature the different subjects are grouped under appropriate heads; so that all papers bearing on the same, or closely related subjects, will be found in one group. The succession of the groups is the same from month to month, and identical with that of the Digest of the Literature. Where a paper clearly refers to two subjects that belong in different groups, it will be noticed in both groups.

Each reference begins with the name of the author in heavyface type. This is followed by the subject of his paper. Then in brackets a number with (ill.) indicates the number of illustrations, or a number with (pl.) the number of plates illustrating the article, (col. pl.) indicates colored plates. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that the paper was read before some society and gave rise to a discussion which is published with it.

The "repeated titles" may render accessible the essential part of a paper, the original of which could not be consulted. These give (in brackets) after the author's name the volume and page of this department of "Ophthalmic Literature" where the title of the paper will be found; and then the journal, volume, and page where the translation or abstract is published.

It is desired to notice every paper as soon as possible after it is published. Readers will confer a favor by sending titles they notice have been omitted, with journal and page of publication; and of their own papers, sending either a copy of the journal in which each appeared, or a reprint. These should be sent as soon as possible to 318 Majestic Building, Denver, Colorado.

## DIAGNOSIS.

- Cruise, R. R.** Visual Acuity for the Army. Ophth. Soc., United Kingdom, May 2, 1918. Abst. Lancet, May 11, p. 675.
- Dunn, P.** Detection of Simulated Blindness. Med. Press, v. 105, p. 334.
- Genet, L.** Visual Acuity and Military Service. Ann. d'Ocul., v. 155, p. 149.
- Gonzalez, J.** Frequent Errors in Ophthalmic Practice. Arch. de Oft., v. 18, p. 196.
- Icard, S.** Signs of Death. Jour. Amer. Med. Assn., v. 70, p. 1964.
- Rasquin, E.** Determination of Visual Acuity, Evaluation of Reeducation of Visual Acuity in Military Service. (7 ill. Bibl.) Ann. d'Ocul., v. 155, p. 117.
- Rönne, H.** Anamnesis with Eye Disease. Hospitalstidende, v. 61, p. 403. Abst. Jour. Amer. Med. Assn., v. 70, p. 1987.
- Standards of Vision for Recruits. Ophth. Soc., United Kingdom, May 2, 1918. Abst. Lancet, May 11, p. 676.
- Visual Factors in Equilibration; Especially Aviation. Jour. Amer. Med. Assn., v. 70, p. 1626.

- Vogt.** Illumination of Eyeground with Light Devoid of Red Rays. Ann. d'Ocul., v. 155, p. 58.

## THERAPEUTICS.

- Gros, H.** Thermo-cautery in Ophthalmology. (1 ill.) Clin. Opht., v. 22, p. 459.
- Guirol, R.** Iodin in Ophthalmology. Revista Med. y Cirurg., v. 23, p. 224. Abst. Jour. Amer. Med. Assn., v. 70, p. 1986.
- Milian.** Adrenalin and Iodin in Ophthalmology. Clin. Opht., v. 22, p. 480.
- Muncaster, S. B.** Treatment of Eye with Ductless Gland Products. Washington Med. Ann., v. 17, p. 187.
- Richard, P.** Treatment of Ocular Syphilis with Galy. (Bibl.) Clin. Opht., v. 22, p. 460.
- Speyr.** Iontophoresis in Ophthalmology. Ann. d'Ocul., v. 155, p. 56.
- Stocker.** Iontophoresis in Ophthalmology. Ann. d'Ocul., v. 155, p. 56.
- Wolffberg.** Prophylactic Measures in Contagious Diseases. Woch. f. Therap. u. Hyg. d. Auges., Jan., 1917. Clin. Opht., v. 22, p. 479.



## REFRACTION.

- Causation of Myopia. *Lancet*, May 11, 1918, p. 679.
- Clarke, E. Correction of Errors of Refraction. *Brit. Jour. Ophth.*, v. 2, p. 323.
- Doyle, P. Myopia and Myopic Astigmatism in Relation to Glare of Mesopotamia. *Brit. Med. Jour.*, May 18, 1918, p. 563.
- Elliot, R. H. Errors of Refraction. *Brit. Jour. Ophth.*, v. 2, p. 313.
- Gould, G. M. Diagnosis, Diseases and Therapeutics of Ametropia. *Brit. Jour. Ophth.*, v. 2, p. 305.
- Kirk, J. Causation of Myopia. *Lancet*, June 1, 1918, p. 781.
- Mason, A. B. Ophthalmoscope, Retinoscope and Author's Pupillary Disk in Refraction. (2 ill.) *Southern Med. Jour.*, v. 11, p. 466.
- Ovio. Optics of Euclid. 500 pp., 260 ill. Milan: U. Hoegli, 1918. *Arch. d'Opht.*, v. 36, p. 126.
- Steiger, A. Myopia. *Ann. d'Ocul.*, v. 155, p. 54.
- Straub, M. Heredity in Development of Myopia. (3 ill.) *Arch. d'Opht.*, v. 36, p. 68.
- Tillyer, E. D., Schultz, H. I. Axial Aberrations of Lenses. Washington, Govt. Printing Office, 29 p., 8vo., 1917.
- Wallace, W. Dioptric Mean in the Myopic Soldier. *Ophth. Soc., United Kingdom*, May 2, 1918. *Lancet*, May 11, p. 675.

## OCULAR MOVEMENTS.

- Argañaz, R. Experimental Nystagmus in the Rabbit. (14 ill. Bibl.) *Arch. de Oftal.*, v. 18, p. 159.
- Bárany Chair Tests and Flying Ability. *Jour. Amer. Med. Assn.*, v. 70, p. 1879.
- Fernandez, F. M. Muscular Advancement for Strabismus. *Amer. Jour. Ophth.*, v. 1, p. 428.
- Gowland, A. Voluntary Nystagmus. *Arch. de Oft.*, v. 18, p. 120.
- Landolt, E. Muscular Advancement. *Arch. d'Opht.*, v. 36, p. 65.
- Rémy, Cantonnet, Valby, and Blum. The Diploscope. *Ann. d'Ocul.*, v. 155, p. 161.
- Schwenk, P. N. K., and Posey, W. C. Contraction of Paretic External Muscle-when Masseters are Contracted in Act of Biting. *Amer. Jour. Ophth.*, v. 1, p. 393.
- Suffa, G. A. Convergence Insufficiency. *Jour. Amer. Inst. Homeop.*, v. 10, p. 1552.
- Swan, C. A., and Lake, R. Examination of 110 Individuals with Regard to Time and Duration of Nystagmus in Caloric Test. *Jour. Ophth., Rhin. and Oto-Laryngol.*, v. 33, p. 118.

## THE CONJUNCTIVA.

- Colombo, G. L. Gram Positive Diplococcus from the Human Conjunctiva. *Ann. di Ottal. e Clin. Ocul.*, v. 40, p. 570.

- Cunningham, J. F., and Wharton, J. Contagious Diseases of Conjunctiva. *Tr. Ophth. Soc., United Kingdom*, May 2, 1918. *Lancet*, May 11, p. 676.
- Doyle, G. F. Diagnosis and Treatment of Trachoma. *Ky. Med. Jour.*, v. 16, p. 238.
- Kirchner. Trachoma and Military Service: *Abst. Ann. d'Ocul.*, v. 155, p. 111.
- Königstein, L. Trachoma. *Wiener Kl. Woch.*, March 23, 1918. *Abst. Med. Rec.*, v. 93, p. 1057.
- Morax, V. Trachoma. *Bull. Soc. Path.*, Paris, 1917, v. 10, p. 269.
- Muro. Epidemic of Acute Conjunctivitis. (Koch-Weeks) *Pediatrics*, 1917, v. 6, p. 378.
- Musy, T. Tuberculosis of Conjunctiva Caused by Bovine Bacillus. *Ann. d'Ocul.*, v. 155, p. 144.
- Paparccone, E. Conjunctivitis Provoked by Nitrate of Lead. (6 ill., 1 col. pl., Bibl.) *Ann. di Ottal. e Clin. Ocul.*, v. 40, p. 533.
- Penichet, J. M. Trachoma in Cuba. *Cron. Med. Quir. de la Habana*, v. 44, p. 211.
- Sgrosso, S. Picric Acid in Cure of Provoked Conjunctivitis. *Arch. di Ottal.*, v. 24, p. 339.
- Shumway, E. A. Vernal Conjunctivitis, Radium Treatment. *Amer. Jour. Ophth.*, v. 1, p. 404.
- Terson, A. Spring Catarrh. (Growths on Conjunctiva.) (1 ill.) *Arch. d'Opht.*, v. 36, p. 85.
- Wherry, W. B., and Ray, V. Cultures of Leptothrix from Case of Parinaud's Conjunctivitis. *Jour. Inf. Diseases*, v. 22, p. 554.
- Woods, H. Recurrent Ocular Inflammation not Relieved by Refraction. *Bull. Univ. Maryland, Sch. of Med.*, 1917, v. 18, p. 145.

## CORNEA AND SCLERA.

- Boas, K. Megalocornea. *Rostock Thesis*, 1916. *Clin. Opht.*, v. 22, p. 489.
- Cross, A. E. Herpes Zoster Ophthalmicus Treated by Pericorneal Neurotomy. *Jour. Amer. Inst. Homeop.*, v. 10, p. 1545.
- Fuchs. Diseases of the Cornea. Graefe's *Arch. f. Ophth.*, v. 92, Pt. 2. *Clin. Opht.*, v. 22, p. 487.
- Grignolo, F. Experimental Parenchymatous Keratitis, *Spirocheta Pallida*. (Bibl.) *Ann. di Ottal. e Clin. Ocul.*, v. 40, p. 551.
- Kumagai, N. Corneal Resorption. *Mitteil. Med. Fakultät der Kaiserl. Univ. of Tokyo*, v. 18, Pt. 2, p. 161.
- Menacho, M. Circumscribed Abscess of Sclera. *Arch. de Oftal.*, v. 18, p. 191.
- Montano, E. F. Keratoplasty. *Anales de la Soc. Oftal. Mexicana*, v. 1, p. 1.
- Siegrist. Keratoconus. *Klin. M. f. Augenh.*, Sept.-Oct., 1916. *Clin. Opht.*, v. 22, p. 488.
- Tillot, E. Keratitis. *Clin. Opht.*, v. 22, pp. 451, 454, 455.

**ANTERIOR CHAMBER AND PUPIL.**

- Bollack, J.** Argyll-Robertson Pupil (Unilateral) After Injury. *Arch. d'Ophth.*, v. 36, p. 106.
- Kumagai, N.** Changes in Intraocular Pressure and Amount of Albumin in the Aqueous Humor. *Mitteil. Med. Fakultät. der Kaiserl., Univ. Tokyo*, v. 18, Pt. 2, p. 103.
- Meirelles, E.** Myosis with Enophthalmos and Ptosis. *Prensa Med., Argentina*, Buenos Aires, March 10, 1918, p. 389.
- Ravenswaaij.** Action of Spoken Word on Width of Pupil. *Nederl. Tijdschr. v. Geneesk.*, Feb. 2, 1918. *Abst. Med. Rec.*, v. 93, 1918, p. 962.

**UVEAL TRACT.**

- Frias, A.** Tuberculosis of Iris. *Vida Nueva*, Havana, v. 10, p. 100. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 1342.

**SYMPATHETIC DISEASE.**

- Pissarello, C.** Sympathetic Ophthalmia. *Ann. di Ottal. e Clin. Ocul.*, v. 40, p. 586.
- Wilson, J. A.** Etiology of Sympathetic Ophthalmia. *Glasgow Med. Jour.*, v. 7, p. 193.

**GLAUCOMA.**

- Elliot, R. H.** Histology of Trephined Disc in Glaucoma Operations. *Tr. Ophth. Soc., United Kingdom*, May 2, 1918. *Lancet*, May 11, p. 675.
- Elschnig, A.** Glaucoma and Tension. *Graefe's Arch. f. Ophth.*, v. 92, Pt. 2. *Clin. Ophth.*, v. 22, p. 483.
- Magitot, A.** Ocular Tension in Traumatism. *Ann. d'Ocul.*, v. 155, p. 66.
- Marbaix.** Use of Schiötz Tonometer. *Ann. d'Ocul.*, v. 155, p. 27.
- Morax, V.** Atypical Subacute Glaucoma. *Ann. d'Ocul.*, v. 155, p. 100.
- Parenteau.** Homeopathic Treatment of Glaucoma. *Clin. Ophth.*, v. 22, p. 465.
- Ruiz, J. M.** Ocular Trephining After Elliot. *Arch. de Oft.*, v. 18, p. 114.
- Wipper, O.** Why Are Lens and Iris Pushed Forward in Glaucoma? *Amer. Jour. Ophth.*, v. 1, p. 427.

**CRYSTALLINE LENS.**

- Gifford, H.** Treatment of Senile Cataract. (4 ill.) *Wisconsin Med. Jour.*, v. 17, p. 1.
- Hoare, W. W.** Operation and After Treatment of Senile Cataract. *Med. Jour. of Austral.*, April 13, p. 297.
- Liégard.** Suture of Cornea in Cataract Operation. *Ann. d'Ocul.*, v. 155, p. 46.
- MacCallan, A. F.** Atropin in Cataract Extraction. *Brit. Jour. Ophth.*, v. 2, p. 347.
- Manes, A. J.** Vacuum Treatment of Cataract. *Semana Med.*, v. 25, p. 173. *Abst. Jour. Amer. Med. Assn.*, v. 70, pp. 1789, 1900.
- Perez Buñill.** Reclination of Cataract. *Arch. de Oft.*, v. 18, p. 128.

**Roure.** Operation for Cataract. *Ann. d'Ocul.*, v. 155, p. 152.

**Talmey, M.** Improving the Operation for Cataract. (3 ill.) *New York Med. Jour.*, v. 107, p. 1108.

Repeated Titles. **Vogt** (v. 1, p. 79.) *Ann. d'Ocul.*, v. 155, p. 57.

**RETINA.**

- Danis, M.** War and Night Blindness. *Amer. Jour. Ophth.*, v. 1, p. 465.
- Lewis, F. P.** Bacterial Toxins as Cause of Retinal Hemorrhage. *Jour. Amer. Med. Assn.*, v. 70, p. 1831.
- Martin, H. H.** Retinochoroiditis Juxtapapillaris. (Bibl.) *Southern Med. Jour.*, v. 11, p. 455.
- Mosso, G.** Hemianopsia and Conservation of Macula. (3 ill. Bibl.) *Ann. di Ottal. e Clin. Ocul.*, v. 40, p. 473.
- Night Blindness. *New York Med. Jour.*, v. 107, p. 1190.
- Young, G.** Clinical Test of Threshold of Light and Color. *Ophth. Soc., United Kingdom*, May 2, 1918. *Lancet*, May 11, p. 676.

**OPTIC NERVE.**

- Barbieri, N. N.** Optic Nerve Lamina and Ganglion. *Compt. Rend., Acad. d. Sc.*, 1917, p. 677.
- Brav, A.** Optic Atrophy in Child After Fracture of Skull. *Jour. Amer. Med. Assn.*, v. 70, p. 1595.
- Malling, B.** Rhinogenous Optic Neuritis. *Norsk. Mag. for Laegevid.*, v. 79, p. 414. *Abst. Amer. Jour. Med. Assn.*, v. 70, p. 1804.

**VISUAL TRACTS AND CENTERS.**

- Keen, W. W., and Ellis.** Ocular Complications in Brain Tumor. *Jour. Amer. Med. Assn.*, v. 70, p. 1905 1908.
- Lemiere, L.** Transitory Amblyopia with Shock. *Ann. d'Ocul.*, v. 155, p. 108.
- Libby, G. F.** Cystic Brain Tumor with Papilledema. *Amer. Jour. Ophth.*, v. 1, p. 424.
- Lloyd, R. A.** Blocking of Macular Arterioles, Cause of Scotoma of Macular Bundle Type. *Amer. Jour. Ophth.*, v. 1, p. 406.
- Loeb, C.** Deep X-ray Treatment in Tumor of Hypophysis. (4 ill.) *Amer. Jour. Ophth.*, v. 1, p. 397.
- Stein, O. J.** Decompression Operation on Hypophysis by Nasal Route. *Laryngoscope*, v. 28, p. 376.

**COLOR VISION.**

- Collins, G. L.** Color Blindness. *Pub. Health Bull.* No. 29, 1918.

**EYEBALL.**

- Lewis, F. P.** Careless Methods in Fitting Artificial Eyes. *Jour. Amer. Med. Assn.*, v. 70, p. 1882.

**LACRIMAL APPARATUS.**

- Francis, C. H.** Management of Epiphora. *Ill. Med. Jour.*, v. 33, p. 325.



**Tillot, E.** Lacrimal Obstruction. Clin. Ophth., v. 22, p. 456.

#### LIDS.

**Claiborne, J. H.** Electrolysis in Removal of Wild Hairs Following Trachoma. Virginia Med. Semi-Mo., v. 45, p. 80.

**Danis, M.** Reconstitution of Lower Cul-de-sac by Cutaneous Autoplasty. (4 ill.) Brit. Jour. Ophth., v. 2, p. 332.

**Gillies, H. D.** Plastic Operation on Eyelids. Tr. Ophth. Soc., United Kingdom, May 2, 1918.

**Sicard and Poulard.** Treatment of Blepharospasm with Alcohol. Marseille Med., 1917, p. 952.

**Tillot, E.** Blepharitis. Clin. Ophth., v. 22, p. 452.

#### ORBIT.

**Chauffard, A., and Monnet, P.** Exophthalmic Goiter with Swelling of Cheeks and Eyelids. Bull. de la Soc. d. Hop., 1918, p. 421. Clin. Jour., May, 1918, p. 80.

**Onfray.** Orbital Swelling and Abscess. Ann. d'Ocul., v. 155, p. 105.

**Palomar.** Phlegmon of Orbit after Dacryocystitis. Arch. de Oftal., v. 18, p. 131.

**Poulard, A., and Réal.** Restoration of Orbital Cavities in Prothesis. (5 ill.) Ann. d'Ocul., v. 155, p. 41.

**Scott, T. B.** Nonsurgical Treatment of Exophthalmic Goiter. Practitioner, 1918, p. 442.

**Velez, D. M.** Use of Conjunctiva in Prothesis Operations. (6 ill.) Anales de la Soc. Oftal. Mexicana, v. 1, p. 7.

#### PARASITES.

**Elliot, R. H.** Removal of Filaria Loa from Eye. Brit. Med. Jour., May 4, 1918, p. 502.

Repeated Titles. **Pacheco Luna** (v. 1, p. 122) Arch. de Oftal., v. 18, p. 107.

#### TUMORS.

**Church, B. F.** Sarcoma of Choroid. California State Jour. Med., v. 16, p. 305.

**Cosmettatos, G. F.** Metastatic Epithelioma of Bulbar Conjunctiva. (3 ill.) Ann. d'Ocul., v. 155, p. 32.

**Garcia Mansilla.** Sarcoma of Right Optic Nerve. Arch. de Oft., v. 18, p. 134.

**Harbridge, D. F.** Tumors of Eyeball and Accessory Structures. Amer. Jour. Ophth., v. 1, p. 417.

#### INJURIES.

**Allport, F.** Magnet Extraction of Foreign Bodies from Eyeball. Amer. Jour. Ophth., v. 1, p. 412.

**Bell, P. G.** Eye Injuries from Broken Glasses. Bull. Canadian Army Med. Corps, April, 1918, p. 26.

**Cuevas Pulido.** Subluxation of Crystalline Lens. Arch. de Oft., v. 18, p. 136.

**Denig, R. C.** Transplantation of Mucous Membrane of Mouth in Diseases and Burns of Conjunctiva. New York Med. Jour., v. 107, p. 1074.

**Frenkel, H.** Traumatic Syndrome and the Anterior Segment of Eye. Ann. d'Ocul., v. 155, p. 78.

**Hansell, H. F.** Concussion of Eye, Removal of Bullets from Orbit. Amer. Jour. Ophth., v. 1, p. 425.

**Holden, O.** Effects of Electric Arc Welding Upon Eyes and Skin. Brit. Med. Jour., April 20, 1918, p. 454.

**Johns, F. A.** Effect of Ultra-violet Rays upon Skin and Eyes. Brit. Med. Jour., May 11, 1918, p. 535.

**Joyce, J. H.** Avulsion of Eyeball in Birth. Brit. Med. Jour., April 6, p. 415; May 25, p. 590.

**Krückmann.** Ocular and Sinus Injuries of War. Abst. Ann. d'Ocul., v. 155, p. 115.

**Maggiore, L.** Ocular Changes Due to Light. Ann. de Ottal. e Clin. Ocul., v. 40, p. 603.

**Newton, L. A.** Early Care of Eye Injuries. Jour. Okla. State Med. Soc., v. 11, p. 177.

**Tuckett, I. L.** Three Magnet Cases with Some Unusual Features. Brit. Jour. Ophth., v. 2, p. 323.

Repeated Titles. **Cantonnet** (v. 1, p. 221) Brit. Jour. Ophth., v. 2, p. 337.

#### PATHOLOGY.

**Lo Cascio.** Constituents of Ocular Pigment. (Bibl.) Ann. di Ottal. e Clin. Ocul., v. 40, p. 505.

#### GENERAL DISEASES.

**Duncan, J. W.** Ptosis (Botulism). Brit. Med. Jour., May 11, 1918, p. 551.

**Franke.** Treatment of Ocular Scrofula and Tuberculosis with External Applications of Tuberculin. Cent. f. p. Augenh., Jan.-Feb., 1917. Abst. Clin. Ophth., v. 22, p. 477.

**Infective Ophthalmoplegia.** Jour. Amer. Med. Assn., v. 70, p. 1876.

**Jackson, E.** Eye Lesions of Infective Jaundice. Amer. Jour. Ophth., v. 1, p. 452.

**Maucione, L.** Therapeutic Value and Indication for Arsenobenzol in Syphilitic Ocular Disease. (Bibl.) Arch. di Ottal., v. 24, p. 297.

**Melland, C. H.** Epidemic Poliioencephalitis (Botulism). Brit. Med. Jour., May 18, 1918, p. 559.

**Merida, N.** Neuroparalytic Ocular Syndrome. (Bibl.) Arch. de Oftal., v. 18, p. 183.

**Netter, A.** Epidemic Lethargic Encephalitis. Jour. Amer. Med. Assn., v. 70, p. 1964.

**Norris, C.** Value of Wassermann Reaction. Jour. Amer. Med. Assn., v. 70, p. 1970.

**Peterson.** Oculocardiac Reflex. Hospitalstidende, Feb., 1917.

**Pierson, P. H.** Tuberculosis of Eye. Calif. State Med. Jour., v. 16, p. 79.

Repeated Titles. **Achard and Binet** (v. 1, p. 391). New York Med. Jour., v. 107, p. 1099.

#### HYGIENE.

**Day-light Screens.** Amer. Jour. Ophth., v. 1, p. 458.



**Marks, L. B.** Practical Standards for Factory Illumination. Amer. Jour. Pub. Health, v. 8, p. 253.

**PROFESSIONAL RELATIONS, EDUCATION, HISTORY.**

**Allport, F.** Eye and Ear Surgeon in the General Army. Med. Rev. of Rev., v. 24, p. 360.

The Blinded in the Halifax Disaster. Lancet, May 11, 1918, p. 681.

**Bordley, J. Jr.** Reeducation of the War Blind. Jour. Amer. Med. Assn., v. 70, p. 1931.

Care of Blind Soldiers in Germany. Brit. Med. Jour., May 4, 1918, p. 513.

Congress of Ophthalmological Society of United Kingdom. Brit. Med. Jour., May 11, 1918, p. 536.

Council of Ophthalmologists. Lancet, May

11, 1918, p. 682. Jour. Amer. Med. Assn., v. 70, p. 1876.

**Hogue, G. I.** Address of President of Eye, Ear, Nose and Throat Section of Wisconsin State Medical Society. Wisconsin Med. Jour., v. 17, p. 8.

**Krückmann.** Institution for The Blind. Ann. d'Ocul., v. 155, p. 116.

**Loeb, C.** What the Oculist can Learn from Other Physicians. Ill. Med. Jour., v. 33, p. 313.

**Santos Fernandez, J.** Should Patients be Informed of Impending Blindness? Cron. Med. Quir. de la Habana, v. 44, p. 206.

**Tillot, E.** Statistics of Ophthalmic Treatment at St. Christau. Clin. Opht., v. 22, p. 458.

Treatment of the Blind. Lancet, May 11, 1918, p. 690. Jour. Amer. Med. Assn., v. 70, p. 1964. Medical Press, v. 105, p. 349.

# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. I

AUGUST, 1918

No. 8

## PEMPHIGUS OF THE CONJUNCTIVA.

CAPTAIN RAY CONNOR, M. D., M. R. C., AND CAPTAIN CHARLES A. BURKHOLDER,

M. D., M. R. C.

U. S. A. GENERAL HOSPITAL, NO. 11, CAPE MAY, N. J.

Report of an atypical case having a history of eight years duration, with colored plate showing lesions on the eyeball.

The opportunity having presented itself to us, to have under our observation for a number of weeks an atypical case of pemphigus of the conjunctiva, it seemed worth while to put it on record, especially in view of the paucity of illustrations of this condition. In some particulars our case followed very closely the classical descriptions of the disease, but it lacked the general symptoms and affected one eye only. This condition is so uncommon that Casey A. Wood has reported that he has seen but three cases in twenty-five years of his practice.

Pemphigus is an acute or chronic disease of the skin and mucous membranes, characterized by the formation of rounded or oval blebs, arising from apparently normal surfaces, which may or may not be accompanied by constitutional symptoms. Chronic pemphigus runs a long course, the bullae continuing to appear and reappear either singly or in crops. Frequently the mouth and throat may exhibit similar blebs, and though rarely, the conjunctiva may be attacked.

Pemphigus has been known to arise primarily in the conjunctiva, and only later involve the skin, although the contrary order is the usual sequence. General pemphigus is more common in children, but ocular pemphigus is an affection of adult life. Statistics show the average age is about 41 years. The

bullae are rarely seen on mucous membranes, because, probably, of the delicacy of their structure. The conjunctiva exhibits on examination grey, necrotic areas or patches deprived of epithelium and covered with grey lardaceous secretion. Inflammatory reaction following the bullae soon penetrates the subconjunctival tissues, and is accompanied by the development of new blood vessels which lead to the formation of cicatrices. Those in turn lead to excessive contraction and shrinking of the conjunctiva, and symblepharon.

C. L. E., a private, 25 years old, was admitted to the U. S. A. General Hospital No. 11, and assigned to the service of Major Burton Chance, April 1, 1918. The patient complained of an affection of his left eye, which has incapacitated him from military duty for the past nine months. His past and family history were unimportant. He admitted gonorrhea 6 years ago, with a previous soft chancre. He had been in the service over four years and able to do full duty until July 8, 1917. He however gives a history of recurrent attacks of inflammation of the left eye for the past 7 or 8 years, which would last for three or four days and then subside. Exacerbations would sometimes come on every month, and at other times the eye would remain clear for several months.

No particular attention was paid to these attacks and the patient was sent to France with the early expeditionary forces. While in France, owing to his increased activities, the attacks became of such a nature that he was compelled to report to the hospital for treatment early in July. Lieutenant Lloyd B. Whitham, M. D., M. R. C., had him under observation in Base Hospital No. 18 for about three months and noted the bullae constantly recurring, either singly or in pairs, both on the bulbar and palpebral conjunctiva. These lasted but a short while and left a greyish membrane. The conjunctiva gradually atrophied and caused a perceptible loss of the inferior conjunctival fornix. He made a diagnosis of pemphigus of the conjunctiva, which was not concurred in by Major Wile, the Professor of Dermatology at the University of Michigan. Major Wile saw the case several times and preferred to call it a pemphigoid affair, thinking it was an exudative erythema.

On admission April 1, 1918, the following conditions were noted:

Vision, R. = 20/30; L. = 20/100.

The left eye showed a slight photophobia, and considerable mucopurulent discharge. Conjunctiva showed marked brownish stain or discoloration on eyeball and in lower culdesac (probably from silver treatment). Lower fornix was almost obliterated by adhesive bands. The left cornea had a linear cicatrix in lower nasal quadrant near limbus, a haziness in outer quadrant and an old fine cicatrix extending across limbus (all evidently results of earlier ulcerations). Iris was clear and reacted well to light and accommodation. Lens and other media clear. Fundus normal. No degree of hyperopia present. The right eye was entirely normal and showed no trace of previous inflammation.

On May 14th, 1918, he showed the first distinct blebs noted while under our care. There were two small blebs, as shown in the accompanying illustration (Pl. XI, Fig. 1), about 1 mm. in diameter, on the bulbar conjunctiva just below limbus. These showed a

sloughing greyish yellow base, slightly raised and surrounded by a local area of conjunctival injection. These areas appeared in less than 24 hours and gradually disappeared in about 3 days. In succeeding weeks, several small lesions of a similar character appeared on the ocular conjunctiva, only to disappear in a few hours.

On June 5th, 1918, a large irregular sloughing area was noted on the ocular conjunctiva 5 mm. external to the limbus in a horizontal line (Pl. XI, Fig. 2). This patch was somewhat raised, 4 mm. in diameter, with a dirty greyish yellow sloughing surface. A small area of conjunctival injection surrounded it. This lesion also disappeared in a few days. No lesions were noted on the palpebral conjunctiva during the period of our observations.

Smears from the conjunctiva taken a number of times showed pus cells, but no bacteria of pathologic significance.

A blood examination showed:

Hemoglobin .....	99%
Red blood corpuscles.....	5,912,000
White blood corpuscles .....	8,400

Differential blood count:

Small mononuclears .....	24%
Large mononuclears .....	4%
Transitionals .....	4%
Polymorphonuclear neutrophiles	66%
Polymorphonuclear basophiles	2%

Wassermann negative.

General physical examination negative.

On his discharge from the army, June 14th, 1918, the eye was comparatively quiet and there were no active lesions evident. The conjunctiva showed a dry, brownish, lustreless surface, and the shrinking of the membranes was much in evidence in the lower culdesac, where broad adhesive bands connected the palpebral and bulbar conjunctiva.

From a close study of the lesion and perusal of the available literature, we have come to the conclusion that this was a true case of pemphigus of the conjunctiva. The lesion itself was identical with those described by other observers. It developed the same way,





FIG. 1. PEMPHIGUS OF CONJUNCTIVA



FIG. 2. PEMPHIGUS OF CONJUNCTIVA  
CASE OF CONNOR AND BURKHOLDER



ran the same course and left identical sequellae. It occurred as usual in an adult and ran a very stubborn and intractable course. The associated lesions of general pemphigus, or lesions in the mouth and throat were, however, lacking as were lesions in the other eye. There is, however, no certainty that the immunity of the other eye will continue, or that general

symptoms may not supervene at any time. At present it must be classified as a mild form of the disease, with a very persistent and chronic course.

Our thanks are due to Major Burton Chance for his kindness and assistance in working up this case, and from whose article on pemphigus in the "American Encyclopedia of Ophthalmology" we have freely drawn.

## QUININ POISONING, ITS OCULAR LESIONS AND VISUAL DISTURBANCES.

LT.-COL. R. H. ELLIOT, I. M. S., RETIRED.

LONDON, ENGLAND.

This analytic review of the literature of the subject combined with the personal experience and conclusions of its author constitutes a clear statement of our present knowledge of impairment of vision by quinin poisoning. It is of especial value at this time.

A titanic world war has flung masses of young men of the Anglo-Saxon race into strange parts of the earth, where they are exposed to the attacks of malaria and other fevers, in a manner hitherto quite unprecedented. The result has been that a large number of our medical men have been comparatively suddenly forced to take a practical interest in diseases, of which they previously knew but little. Their response to the call of duty and of science has been magnificent, but it would be strange if the position were not beset with danger. At a recent discussion on the treatment of malaria before the Society of Tropical Medicine (London, March 15th, 1918), tropical experts of the first calibre discussed the doses of quinin, which had been advocated on the strength of reports received from military surgeons; and the writer sat astonished to hear of one medical man giving 90 grains a day for 7 days, and further doses thereafter; and of others advocating the use of the drug in quantities which appeared enormous. The problem that today interests the surgeons of the British Empire, and the young men un-

der their charge, will shortly enfold the gallant armies, which are crossing the Atlantic Ocean to take their stand by our side in the great struggle for the liberty of the world.

The writer has recently read very carefully the whole literature of quinin poisoning, and has been profoundly impressed by the great possibilities for harm that may lie concealed in the present movement towards unrestricted use of the drug. It is 22 years since de Schweinitz dealt with quinin poisoning in his classic work on toxic amblyopias; and tho, both before and since that time, a very large literature has grown round the subject, no effort appears to have been made to deal with it at all exhaustively, within the limits of a single communication. The present would, therefore, seem to be a suitable time to consider the subject in all its bearings, to review what has been written and learned, and to raise a note of warning, lest in our endeavor to extinguish the germs of malaria, we should be led into the dangers that surround the abuse of quinin. To save a man from death, only to leave him amblyopic, hemeralopic,



and with contracted fields is to render him a poor service indeed; and one for which many would curse and not bless us. The oft-expressed sentiment "I would rather be dead than blind" is one that finds a strong echo in many of our hearts. One purpose of this paper, and not the least important, is to point out how easy it is to diagnose quinin poisoning. The most recently qualified medical man can do it, and he who is armed with this knowledge, will not be led into the danger of mistaking the signs of deep cinchonism for those of malaria, an error, which when committed, is fraught with disaster, and possibly even with death for the patient.

#### DOSE OF QUININ WHICH MAY GIVE RISE TO EYE SYMPTOMS.

A study of the reported cases of quinin blindness reveals the most startling variations in the dose of the drug required to produce pathologic phenomena in different patients. One will take with impunity a dose which seems simply enormous, whilst another will show failure of vision from a quantity of quinin, which to the ordinary person would be absolutely innocuous. There are, however, certain factors which we must take into account in every case: These are: (1) The salt of quinin employed; (2) the vehicle in which the dose is given; (3) the method of its administration; (4) the total amount of the drug retained in the system; (5) the individual idiosyncrasy of the patient; (6) the age, sex and weight of the patient.

(1) *The salt used.* The sulphat of quinin is probably still employed more commonly than any other preparation, tho the hydrochlorid is very popular. If one may judge from the recent discussion before the Society of Tropical Medicine (London, March 15th, 1918), these two salts stand far ahead of all others in the esteem of experts. The relative solubilities of the various quinin preparations are given below in a tabular form.

Salt of quinin—	—Solubility—	
	In water	In alcohol
Sulphat . . . . .	1 in 800.	1 in 65.
Acid sulphat . . . . .	1 in 10.	1 in 45.
Hydrochlorid . . . . .	1 in 35.	1 in 3.
Acid hydrochlorid . . . . .	1 in 1.	1 in 5.
Hydrobromid . . . . .	1 in 55.	1 in 0.7
Salicylat . . . . .	1 in 630.	1 in 24.

An important observation was recorded at the above meeting of the Society of Tropical Medicine by Dr. Nierenstein, who had analyzed the urines of a number of patients who had been taking quinin salts. He found that the percentage of quinin in the urine was practically constant, regardless of the salt used (sulphat, hydrochlorid or hydrobromid), or of the amounts that had been administered. From this he deduced that there was a limit to the amount of the drug that could be taken up by the blood, and that this limit was indicated by the quinin-content of the urine. He made the suggestion that if a more soluble salt than the sulphat or hydrochlorid were used, the quinin-content of the drug could be greatly raised, thus intensifying the action of the drug on the malarial parasite. The form in which quinin is excreted is in combination with urea. He thought, therefore, that a carbamid of quinin might be the very substance for which tropical physicians were looking. The writer drew attention to the fact that de Schweinitz, in his experiments on animals, had used a carbamid of quinin as well as other preparations, and had found that salt more toxic than any other. Whilst, therefore, it might prove powerfully therapeutic, there was the possibility that by so highly cinchonising the blood, it might act unfavorably on the retina and optic nerve, and determine amblyopia and amaurosis.

It has sometimes been said that quinin is more dangerous than any of the other alkaloids obtained from the cinchona bark. But it seems possible that the true interpretation of this statement lies in the fact that quinin is in much more common use than any of these other substances.

(2) *The vehicle in which the quinin is given.* Some of the patients, who presented pathologic signs, took the quinin in the form of powder, others in pills, others in one form or another of solution; whilst yet others drank comparatively large quantities of alcohol immediately before or afterwards. This must undoubtedly have tended to intensify the action of the drug, by bringing it rapidly into solution in the stomach. On the other hand, the ingestion of quinin in pill or tabloid form introduces a great element of uncertainty into our estimate of the quantity of the drug actually absorbed into the system. Every tropical practitioner knows that stale pills or tabloids of quinin become as hard, and almost as insoluble as stone, and are passed through the alimentary canal from end to end as inert, useless masses. Even when fresh pills have been swallowed, if the quantity is large, the bulk and cohesion of the mass make it easily vomited in the first instance; and disposed to set up irritation, and so be rapidly voided in diarrhea movements, in the second. We shall return to this under our fourth heading.

(3) *The method of administration of the drug.* One of the most interesting points brought out at the recent meeting of the Society of Tropical Medicine was the apparently undivided consensus of opinion that the oral method of administration is far and away the most satisfactory. Not a good word was said for intravenous injection, despite the fact that on the face of it, this would appear to be the only method which attains to absolute certainty in the knowledge of the dose administered. The comments on subcutaneous and intramuscular injection were equally unfavorable. This is not surprising, inasmuch as it has long been known, that when quinin is given in this way, a large quantity of it may remain indefinitely unabsorbed. It has fallen to the lot of many surgeons in the Tropics, to cut down upon and evacuate large masses of the kind, on account of the great irritation the patients suffered from them. Finally, amongst the records of quinin ambly-

opia, one finds a certain number of cases in which the drug was given per rectum, either in the case of children, or of others in whom gastric irritability provoked an intolerance of further administration by the mouth. This is a point to which the most earnest attention of the reader is invited, for it would seem that the little known symptoms of cinchonism were in some of these cases mistaken for those of malaria, and that the drug was consequently pressed, at a time when it should have been totally withheld. It is not difficult to see how disastrous such a course of conduct may prove.

Before leaving this topic, it is of interest to note the various conditions which led to quinin being taken in what proved to be poisonous doses. In the forefront of these, of course, stands administration by medical men, or by the patients themselves, for one or another form of fever, the most common of which was malaria. Many other febrile conditions, however, figure on the list, inclusive of pneumonia, influenza, chills, and numerous ill-described pyrexial states. A mention must also be made of "neuralgias," sometimes considered to be of malarial origin, and of toothache. Next we find a large group of cases in which the drug was deliberately taken for some improper purpose, especially for suicide, or for the production of abortion or miscarriage. Lastly we have the quite considerable group of "accidents." It certainly seems strange that a man or woman should swallow a huge dose of quinin sulphat by mistake for some comparatively innocuous salt, such as cream of tartar, but it unquestionably has been done (Giacomini). In all these self-prescribed instances the drug has been taken by the mouth.

(4) *The total amount of the drug retained in the system.* This point has been taken up several times under the preceding headings. It is obviously one of very great importance in our estimation of "the dangerous dose." In many of the records we learn that the patient vomited quite half the dose given, or that he "passed a large quantity of quinin by the bowel."

Again in the subcutaneous and intramuscular injection, usually no allowance seems to have been made for the fact that much of the drug probably lay inert, where it was first thrown by the syringe. The uncertainties thus introduced into our estimations are too obvious to need emphasizing. When the dose is accurately stated in the first place, it is the outside dose, but, the exact deductions we must make therefrom, in order to arrive at the quantity of the drug that did the damage, are more than open to question. This must be frankly recognized throughout.

(5) *The individual idiosyncrasy of the patient.* From the point of view of the dangers that attend the path of the prescribing physician, when dealing with malaria, this factor probably far outweighs any other. It constitutes the great risk, beside which all others fade into unimportance, and it consequently demands a separate section to itself. For this reason it must be dropped for the present, with the simple comment that in this quinin only falls into line with all the other drugs, which are responsible for producing one or other form of toxic amblyopia.

(6) *The age and sex of the patient.* This probably resolves itself very largely into the weight of the subject, since women are on the average lighter than men, and children than adults. On the other hand, there seems some reason to think that women and children are especially liable to quinin poisoning. Allowance must of course be made for the fact that quite a number of the recorded cases have been in women who desired to produce abortion, and who took large quantities of the drug for that purpose. Probably, too, in some of the attempted suicides the motto was "death or abortion." It is, however, of the utmost importance constantly to keep in mind the dose of quinin in grains, as compared with the total body-weight of the patient. De Schweinitz showed this in his early experiments on animals, and it is so cardinal a rule that it might seem a work of supererogation to insist on it, were it not for the fact that this essential

piece of information is very rarely given in the published records of cases of quinin amblyopia.

When the writer first started collecting the material for the present paper, he did so under the influence of many years of extensive experience with malaria and its treatment in southern India, where his opportunities of meeting with quinin amblyopia would have been exceptional, had such cases really been common. He believes that the dictum of Laveran "not more than 45 grs. of quinin to be given in 24 hours," holds widely there; and to this he attributes the remarkably small number of cases of quinin blindness which he met with in the Madras Presidency. He cannot with certainty remember more than 4 or possibly 5 such cases. Altho there were others which, judging from the ophthalmoscopic appearances observed, might doubtfully have fallen into the same category, it was impossible to be sure of the origin of the trouble in the absence of reliable histories. The result of such an experience was that the writer's attention was at first directed only to the records of those cases in which the patient had taken 2 drachms or less of quinin in 24 hours. Even then, quite a number of cases were found. The state of affairs which exists; or, perhaps one should say, existed, in certain backward parts of America, where doctors were scarce and the patient helped himself liberally out of a stock quinin bottle, hardly seemed to interest the surgeon who lives in parts where civilization has had time to progress. The opinions expressed by malaria experts of the first rank at the recent meeting of the Society of Tropical Medicine in London, have, however, compelled a modification of the standard thus set up. If military medical officers are going day after day to give from 60 to 90 grains a day, and then to carry on with lesser doses for a considerable time, we must include the cases which have shown toxic amblyopia after the administration of an ounce or more of the drug. Otherwise we shall not have a complete mental picture of the risks incurred. Of one thing there can be



little doubt, namely, that the cases of quinin poisoning reported are but a fraction of those which have actually occurred. The writer has no wish to be an alarmist, but he cannot but feel that the new movement is fraught with perils which it is the duty of the ophthalmologist to point out.

#### DOSES OF QUININ WHICH HAVE PROVED TOXIC.

We shall start with the cases in which the dose is described as huge, immense, heroic, very large and so on. These are the cases of Behse, Browne (male, aged 34), Bruns (a male aged 16), de Schweinitz (a male aged 40), Fox (a male aged 13), Harbridge (5 sailors, each of whom took a large dose of quinin), Hobby (a female, aged 21), Knapp (two male children, aged 3), Nettleship (a male, aged 29), O'Brien (a male, aged 33), and Williams (a male, aged 14). Everyone of these appears to have been permanently damaged in sight.

Next comes the group in which the dose was about an ounce and upward: Calhoun (a female, aged 10, took one and a half ounces in three days), Guer-sent (an adult female took 631 grains in a few days), Jodko (1,694 grains of hydrochlorid of quinin in 7 days), Michel (a male, aged 38, took 670 grains in 6 days), Reina (a male, aged 30, took 462 grains at one dose), Roosa (500 grains of cinchona in tincture), Shahan (a female, aged 28, took one ounce of quinin in six hours, during labor), von Kubli (a female, aged 23, took 454 grains), Williams (a male, aged 42, took one ounce in a week). In each recorded case the damage to vision was permanent.

We next take the doses from about 3 drachms to half an ounce: Giacomini (a male, aged 45, took 180 grains), Kalebiakin (154 grains of quinin), Kirkpatrick (a female, aged 30, took half an ounce of quinin), Manolescu (a female, aged 30), took 200 grains of quinin), Parker (a male, aged 43, took 240 grains of quinin), Roosa and Ely (a female, aged 30, took 280 grains of quinin in 6 days), Tyson (a male, aged

23, took 240 grains of quinin in 3 days), Underhill (a female, aged 20, took 200 grains of quinin in pills, but vomited and passed a quantity), Weeks (a female, aged 51, was given 150 grains of quinine per rectum by mistake), and Zani (an adult, took 300 grains of quinin). In all these cases the damage seems to have been permanent.

In the next group we place the doses of about 100 grains: Ayres (a female, aged 7, was given 104 grains in 3 days), Harbridge (an adult male took from 60 to 120 grains in whisky), Kalebiakin (dose 100 grains), Keiper (a male, aged 75, took 120 grains after a drinking bout), Myer (a female, aged 20, took 120 grains in lime juice and water), and Terrien and Aubineau (a dose of 115 grains).

Our next group includes doses of from 40 to 80 grains of quinin: Beydler (a dose of 40 grains of quinin sulphat), Cargill (a female, aged 28, took 60 grains of quinin sulphat), Claiborne (a dose of 60 grains), Fortunati (a male, aged 59, took 46 grains of the hydrochlorid in two doses, and died of fever), Gruening (a female, aged 35, took 80 grains of quinin sulphato in 30 hours), Kalebiakin (dose 80 grains), Kaz (an adult female took 40 grains of the hydrochlorid), M'Gillivray (a male, aged 54, took a 40-grain dose, probably with alcohol), von Speyer (a female, aged 41, took about 60 grains of quinin, of which she vomited half), Weeks (a female, aged 6, was given 80 grains in 3 days), and Welton (a male, aged 31, took 55 grains of quinin in a quart of whisky). Again, as far as can be judged from the records, permanent damage was left behind in each case of these last two groups.

The next group includes the really small doses whose action points to a strong personal idiosyncrasy on the patient's part, except in the case of the child: Bruns (a female child, aged 3, sustained permanent visual damage from a dose of 30 grains of quinin sulphat, given by the rectum in the course of 15 hours), Calhoun (a male adult had temporary amblyopia whenever he took 10 grains of quinin), de Schweinitz (temporary amblyopia followed the

administration of 15 grains of quinin in divided doses in 24 hours), Miller (a sailor, aged 55, took 5 grains daily for 3 or 4 weeks and had temporary amblyopia), Nettleship (a male, aged 26, took 22 grains of quinin in 3 days and was still amblyopic 3 weeks later), Schwabe (a female, aged 33, took 19.29 grains of quinin hydrochlorid for toothache, and her sight was permanently injured thereby), Wood (an adult female suffered from amblyopia after taking 12 grains of quinin). The writer has under his observation a man of 60 who suffers from amblyopia with contracted fields if he takes 2 grain of quinin.

Our last group is full of interest. It contains the cases collected by Conner, all of which either proved fatal, or at least gave rise to very grave anxiety. In Conner's own case, extreme cardiac depression with collapse was met with in a male, aged 27, following the ingestion of 6 grains of quinin. Death seemed imminent, but the patient recovered. It was known that he had always had a strong susceptibility to quinin, an idiosyncrasy which he shared with a brother and a sister. The following cases are mentioned in Conner's communication: Wood's patient showed very alarming symptoms after taking 2 grains of the drug; so did a girl of 13, under the care of Micciche, who had taken 8 grains of quinin. Upshur's case gave great cause for anxiety after a dose of 30 grains, and on a later occasion after a dose of 8 grains Huseman published 4 fatal cases, following the ingestion of 3 drachms, 5 to 10 drachms, 45 grains (in a child of three and a half), and 16 to 20 grains (in a child of two). To this list we must add the cases of the three Chinese coolies, mentioned by Gimlette, each of whom received about 90 grains of sulphat of quinin, in a single dose, on an empty stomach. Two died and the third was very ill with deafness, diplopia and delirium, but recovered.

It must not be forgotten that Berandi noted headache, tinnitus and obscuration of vision as signs met with in his experiments on healthy individu-

als, to whom he administered doses of from 15 to 20 grains of quinin.

#### ALCOHOLIC AND ACID SOLVENTS.

Attention has more than once been directed to the danger that may accrue from giving quinin either in, or in connection with, an alcoholic or acid solvent. The cases of Harbridge, Welton, M'Gillivray, Keiper and Myer are all to the point. Their interest lies in the great severity of the symptoms at the time of the first poisoning, and in the extent of the permanent damage done. When one considers that these were all adult males, and that the doses taken were none of them really large (respectively 60 to 120 grains, 55 grains, 40 grains, 120 grains and 120 grains), one cannot easily resist the conviction that great care should be taken to regulate the doses of this powerful drug, when giving it in combination with solvents. The plain indication would appear to be that we should not let the quantities administered get out of hand, until we have made sure that the patient has no idiosyncrasy for quinin. It may be said that the same remark could be made with equal justice about quinin being given in any other form. Whilst this is quite true, the danger seems to be accentuated in dealing with dissolved and concentrated quinin, and therefore extra caution is demanded under such circumstances.

There are points of interest in connection with the *repetition even of small doses* of quinin. Thus, Miller's patient, a ship's captain, aged 55, took only 5 grains a day with the exception of one occasion on which he doubled the dose. Yet, after 3 to 4 weeks of this treatment, he had developed typical signs and symptoms of quinin amblyopia. It is true that he was a heavy smoker, but the ophthalmoscopic appearances presented, the absence of central color disturbances, the restriction of his visual fields, and the recovery of central vision, when quinin was stopped, show clearly that it was a case of poisoning by this drug.

It is of course possible that tobacco contributed to the toxic effect, just as we may see optic atrophy progress in a glaucomatous eye after the complete re-

lief of tension, owing to the existence of some other hitherto unrecognized cause of autointoxication. That the latter is the correct explanation in such cases would seem to be clear from the fact that the removal of the accessory cause of auto-intoxication will sometimes arrest the atrophic process started by the glaucoma. It is possible that the action of quinin may be accentuated in the same way by that of one of the other drugs, which produce toxic amblyopia.

An extraordinary and somewhat unexpected light would appear to be thrown on this subject by Schwabe's case, of a woman of 33, who had suffered from quinin amaurosis for 19 hours, and from amblyopia for three years after a dose of 19.29 grains of muriat of quinin, administered for toothache. Whenever she took a cup of strong coffee or strong tea, the retinal vessels could be observed to become powerfully constricted, and the fields of vision narrowed down almost to the fixation point. The maximum effect was attained in one hour, and the trouble had passed away in two. There was no evidence of permanent loss of central visual acuity, of central color vision, or of the area of the fields of vision, despite the fact that the patient daily indulged in these beverages, thus frequently repeating in her daily life what one would have thought was a hazardous experiment.

Caffein or thein is known to be a cerebral stimulant, and as such has been advocated in the treatment of quinin amblyopia, in spite of the fact that more than one writer has suggested, possibly on not very good evidence, that it may itself be a cause of toxic amblyopia. Schwabe's careful observations are calculated to revive such suggestions, and to indicate a measure of care in our use of the drug in quinin amblyopia. It is possible that the cases in which it acts disadvantageously are instances of individual idiosyncrasy, but it would be unwise to forget the lesson they teach. The writer, however, knows of one case in which the administration of strong coffee definitely resulted in the amelioration of the signs and symptoms of quinin amblyopia in a patient who is so sensitive to

the drug that he presents contracted fields and interference with vision after so small a dose as two grains of quinin sulphat.

De Schweinitz lays stress on the *liability to relapse* shown, after the exhibition of small doses of quinin, by patients who have already suffered from poisoning by large doses of the drug; and draws attention to the fact that Knapp and Nettleship had both made similar observations. He himself has noted an exactly similar sequence of events in animals. Manolescu, in his very careful treatise on quinin poisoning, has drawn special attention to this phenomenon, and has urged that in the case of all patients, who have been known to have had quinin amblyopia in the past, the greatest care should be exercised, not only with regard to the use of the cinchona alkaloïds, but also to that of any of the other poisons, such as alcohol and nicotin, which are known to be liable to produce amblyopia in any form.

The literature available contains at least two highly illustrative cases, which demand a short notice. Weeks' patient, a girl of 6, was given 60 grains of quinin one day by the rectum; and 20 grains more in the next two days. She suffered from severe amaurosis, but eventually recovered her central vision, tho the fields remained much contracted. Twenty months later she was given a single dose of 10 grains of quinin in one day, with the result that the signs and symptoms of poisoning of the optic nerve and retina returned with great intensity. Altho she again recovered to some extent, a good deal of the damage done on the second occasion was permanent. In Hobby's interesting case "very large doses of quinin had been required to produce cinchonism" in the first instance; but when, on a later occasion, 20 grains of the drug were administered, the patient had a very severe return of amblyopia; which affected both her eyes, whereas in the original attack, the right had nearly escaped.

#### METHOD OF ONSET AND COURSE OF ATTACK.

A very careful analysis has been made of the reported cases of quinin poison-



ing, with a view to ascertain the methods of appearance and of development of the signs and symptoms of this condition. This survey has revealed very great differences in different cases. This is only what might have been anticipated, in view of the facts that the size of the dose and the method of taking it varied very widely, as did also the age, weight and sex of the patients, and the measure of individual idiosyncrasy. Even this list does not exhaust the disturbing factors present. Many of the cases are very indifferently noted, and important points are slurred over or are altogether omitted.

It is quite obvious that in not a few cases the observers failed for comparatively long periods to grasp the true nature of the patients' troubles, and continued to pile up the doses of quinin when the drug should have been at once and completely withdrawn. Some of the most melancholy of such cases are those in children, in whom it seems to have taken days before it was recognized that the little patients were blind. It is clear that in many of the cases, the onset of acute cinchonism was mistaken for a recurrence or a development of the disease for which the drug was given. If there is one thing that should be written in heavy type across the literature of this subject, it is that *quinin poisoning is a condition which can be diagnosed with ease and certainty by the least experienced practitioner, and that mistakes, such as those which abound in these records can and should be erased from medical experience.*

The administration of medicinal doses (10 to 15 grains) of a salt of quinin gives rise in normal subjects to a train of symptoms, which is so constantly met with and of such slight clinical significance, that it is best described under the term "cinchonism"; reserving that of "quinin poisoning" for the more serious form of the same condition, which attends the ingestion of large doses, or that of comparatively small doses in very susceptible subjects.

**CINCHONISM.**—Soon after taking the quinin, the patient complains of ringing in the ears, deafness and a feeling of fullness in the head. Headache, which

may sometimes be very severe, may be experienced. Giddiness may supervene, and the patient may even stagger in his walk. Often he will wish to lie down, and feeling drowsy, he may quickly fall asleep. All these symptoms are transitory and as a rule have passed away completely the next day; always provided, of course, that further doses of the drug are withheld.

**QUININ POISONING.**—In a very large number of the recorded cases in which a single large dose was given, the signs of this condition are described as coming on "the next day"; or "after the patient awoke" from a heavy sleep, or from a comatose condition which followed the dose. There can be no reasonable doubt that the real evidence of the quinin intoxication was forthcoming much earlier, had it been looked for, but was missed owing to the patient's drowsy condition, or because it was not anticipated. Often, the striking symptom that first arrests attention is partial or complete blindness. The accompanying deafness is usually made less of, because as a sign of cinchonism it is so familiar as to have bred contempt. When the drug has been more gradually administered, failure of sight may again be the first sentinel symptom. As will be seen later, the interference with vision may be noticed within the first half-hour or even quarter-hour, and may steadily and rapidly deepen.

**DIMINUTION OF CENTRAL VISUAL ACUITY.**—The onset of central blindness is so striking a symptom that it compels the attention of the patient in a way that no other does. If one were to judge from the text of the reports alone, one might reach the conclusion that the onset of blindness was often sudden. If a surgeon were on the lookout for the well known symptoms from the first, it seems more than probable that he would find the loss of sight heralded by amblyopia and contraction of the field of vision. This has certainly been the case in a few instances, where close observation was possible.

Much depends on the dose and method of administration of the quinin. When a single large quantity of the drug has been

taken, interference with vision has been noted in a few cases in from a quarter to half an hour (de Schweinitz, Kalebiakin's three cases, Manolescu, Myer); a number of other observers are content to describe the blindness as coming on "soon after" the dose was taken (Harbridge, Nettleship, Roosa, Trousseau and Pidoux, Underhill and von Speyer). In one of Weeks' cases, in which the dose was very large, the period mentioned was three hours; in Schwabe's patient five hours elapsed, but the dose was here under 20 grains.

We come last to the patients, who first noticed blindness on awaking next morning, or on recovering consciousness after several days of coma; with them we have already dealt; it is impossible to say when their symptoms commenced. In considering the patients in whom the administration of the medicine was spread over a number of days, it is much more difficult to obtain anything like scientific accuracy, but it is quite clear that in them the drug produced a cumulative effect.

In saying this, it is not implied that the concentration of quinin in the blood increased steadily, for such a suggestion would be contrary to the known facts, but rather that the continued toxic action sufficed in time to bring about a condition of blindness which comparatively large earlier doses failed to do. It is of interest to note that in two cases, the final extinction of vision was instantaneous; so much so as to suggest sudden vasomotor constriction as its cause. Thus, Browne's case said his "sight went out as if you had turned out the gas," while in Michel's patient it is recorded that "vision suddenly went out."

The *development of the blindness*, from the moment of its first appearance until it became complete, varied enormously. A few never attained to complete amaurosis but were seriously alarmed by the degree of their amblyopia. Cargill's patient could not find her way about her room; whilst Welton's patient stumbled over objects on the floor and complained of hazy vision. In a number of the worst instances, complete amaurosis appears to have been very rapidly established. There can be but little

doubt that a large number of cases, in which a moderate amblyopia is present, fail altogether to be recorded or even to attract attention.

Then again, the *duration of the blindness* varied enormously. In a few, it had begun to pass off in from 14 to 24 hours (de Schweinitz, 14 hours; Schwabe, 19 hours; Keiper, 22 hours; Harbridge, 24 hours). In a number of others the period varied from 2 days up to 2 weeks (Underhill, 48 hours; Collins, Kaz and M'Gillivray, each 3 days; Weeks, 4 days; Manolescu and Weeks, each 5 days; Ayres and Tyson, each 7 days; Parker and Williams, each 8 days; Bruns, 13 days, and Behse, 2 weeks). A few still longer cases are on record, in some of which the exact date is not specified (Shahan, 18 days; Michel, 32 days; Reina, 8 weeks; Voorhies, 10 weeks, whilst in Calhoun's case the patient was lost sight of still totally blind 10 weeks after the dose). In some of the animals he experimented on, de Schweinitz found the loss of vision still total at the expiration of two months.

It is one thing to estimate, as we have just done, the period at which vision commenced to return; it is quite another to determine when full sight was restored. A careful survey of the records cannot fail to suggest the gravest doubts as to whether complete restoration of vision ever occurs in an amaurotic case. The question is largely one of degree, of the care with which the examination is made, and of the standard accepted as "perfect vision." This will be taken up more fully under the headings of light sense, and of the fields of vision. Meanwhile we may mention that in one of Kalebiakin's cases, the complete restoration of vision was said to have been "almost immediate." Manolescu and Zani each reported full recovery in 14 days; Nettleship in 3 weeks; Kalebiakin in 1 month; Underhill and Williams each in 6 weeks; Parker in 3 months; Brown in 4 months; Weeks in 1 year, and Tyson in 14 months.

In addition, there are a number of records of even longer periods, but it is probable that these represent the times at which the cases were again seen,



rather than those at which recovery could have been claimed to have occurred. A very interesting feature of some of the cases is that vision improved up to a certain point, and then went back again. A late second improvement may again be noted (Demichieri, Goldzieher, Kirkpatrick, Mellinger, Michel, Roosa, Ely and Weeks). Finally, it remains to mention that the records clearly show that in a large number of the cases a visual acuity of 6/6 was never reattained, whilst the silence on this subject of many of the reporters is still more significant. Even if central vision be alone accepted as the basis of our judgment, which it obviously should not be, the writer is at wide variance with the optimistic views of Manolescu as to the ultimate restoration of vision after quinin amaurosis. The reasons for this opinion will be better appreciated after a perusal of the next few sections.

**ALTERATIONS IN LIGHT SENSE.**—It seems probable that a defective light sense would have been found in quite a large number of the patients, who have suffered from quinin amaurosis, if only the examination had been sufficiently careful and exhaustive. It is significant that our sources of information on this head come from the observations of comparatively few writers, most of whom were ophthalmologists of exceptional note. It is quite obvious that in the majority of the cases, no careful estimation of the light sense was made; indeed, the possibility of a defect in it does not often seem to have been taken into account. In any case it would be difficult to estimate such a defect in the early amblyopic stages, and nearly all the notes refer to a late period of the affection. An exception to this rule is found in Nettleship's patient, who "found he could stare at the sun without inconvenience" shortly after the commencement of return of vision. Two months later, he complained of seeing badly in a bright light, and of a mist before his eyes in the early morning. Weeks observed a marked diminution in light sense in both of his cases of quinin poisoning. One of his patients complained bitterly of reduction in this sense up to the day of her death; whilst in the other light percep-

tion was diminished and light adaptation slow 35 years after the origin of the poisoning. Roosa and Ely's patient was reported 3 years after the intoxication, as never having seen well since she took the quinin. She "felt as if a veil were over her eyes." De Schweinitz' patient was markedly night blind after 8 months, and his light sense was reduced to 0.6 of the normal. Welton's case resembled this in being badly nyctalopic after 2 years; although it was doubtful whether he had ever been absolutely amaurotic. Other instances of damaged light sense are recorded by Ayres, Bruns, Manolescu, Panas, Parker, Schwabe, Shahan, Williams and Zanotti.

**ALTERATIONS IN THE VISUAL FIELDS.**—A constriction of the visual fields is probably the most constant sign of quinin poisoning of the eyes. As the amaurosis or amblyopia passes away, it is found that the patient is considerably hampered by the loss of his peripheral vision. He stumbles over objects on the floor, or has difficulty in finding his way about a room. This defect continues when the central vision, as measured by the test types, has returned to normal, and may give rise to very grave inconvenience. On the other hand, when the dose has been comparatively small, rapid improvement may take place, and after a period of months or even of weeks, the recovery may be so great as to lead the patient and his medical adviser to believe it perfect. Without denying that such a happy result may sometimes be attained, it is quite certain that such cases constitute the exceptions and not the rule. In a very large number of instances, a permanent and often progressive reduction of the visual fields has been recorded. This is sometimes so extreme as to constitute "tube vision," (de Schweinitz, Kalebiakin, Schwabe, Tyson, von Kubli, von Speyer, and Weeks), whilst in quite a large number of cases the defect, though less extreme, is yet well marked.

Improvement may go on taking place for months and apparently even for years (Tyson and Weeks). On the other hand, the fields may enlarge up to a certain point and then become nar-



rowed again. It is possible that these secondary deteriorations are due to the unwise administration of quinin on a later occasion, as happened in Weeks' case; or to the abuse of some other toxic drug, such as caffein (Schwabe).

Calhoun has recorded the case of a prominent physician, who found that 10 grains of quinin made him amblyopic, whilst repetitions of the dose caused alarming symptoms. The writer has under his care a man of 60, in whom a dose of 3 grains of quinin will at any time cause marked constriction of the field. It is probable that such cases as those above quoted explain the late deteriorations of the fields which are on record, but it is of course quite possible that the latter may occur independently of the administration of toxic drugs.

It has from time to time been suggested that the typical visual defect in quinin poisoning leaves a horizontally elliptical field, the upper and lower areas being more encroached upon than the lateral ones, (Harbridge, Knapp, M'Gillivray and Welton). Again, it has been suggested that one area of the field, as the temporal or the nasal, tends to clear up sooner than the others. A survey of all the records lends little support to such suggestions, the contraction being apparently usually concentric. Some very anomalous fields have been noted; thus Mosso described a paracentral scotoma, which was first absolute, later relative and finally annular; whilst Bietti, Galezowski and Jodko all record instances of central scotomata.

**ALTERATIONS IN THE PERCEPTION OF COLORS AND IN COLOR FIELDS.**—In those cases in which the central color vision was tested at a very early stage, it would appear to have been uniformly deficient or absent. Improvement, however, set in fairly early in most cases. In some, the central color vision again became perfect (Browne, Bruns, Cargill, de Schweinitz, Schwabe and Williams). In others, the recovery was less complete, (Keiper, Tyson and Williams). Shahan's case was totally blue-green blind after 3 months. One of Weeks' cases was green blind after 2 years, but a second small dose of quinin had been given in the interval. Knapp's patient was at

first totally color blind. This gave place to red-green blindness, then green and grey were confused, and finally, at the end of five years, complete color perception was reestablished. The extraordinary variability in the course of the recoveries is illustrated by comparing the last case with that of Cargill, whose patient could not distinguish colors on the ninth day, but could do so on the forty-fifth. Still more striking is Schwabe's case, in which there was no color vision 43 hours after the dose, while on the 5th day, the central color perception was good. The notes on the state of the color fields are scanty, but they were reported to be greatly contracted by Browne, de Schweinitz, Stasinski and Welton.

**DILATATION OF THE PUPIL.**—In the great majority of the cases of quinin poisoning the pupil is described as being fixed and dilated, the latter often to an extreme degree. No observations appear to have been made as to the exact time when the pupil begins to enlarge, but from his observation of a very susceptible case, the writer thinks that this probably takes place at a very early stage. It is a phenomenon of the greatest importance, inasmuch as it enables even one who is not an expert to get a good and easy view of the fundus. The combination of a dilated pupil with the typical ophthalmoscopic appearances should leave no doubt as to the rôle of the drug in the causation of blindness. As the case progresses, and the patient recovers vision, the extreme dilatation of the pupil passes away, and the normal movements are reestablished.

But it is probable that some enlargement remains permanently in quite a number of the cases, nor is it certain that the movements wholly regain their former activity and rapidity. In Cargill's case the pupils reacted slightly to light and accommodation on the thirty-eighth day, and well on the seventy-eighth. The pupils were slightly dilated and the iris reaction was sluggish in Reina's patient, 6 months after the poisoning. The same held true for the right eye in Kirkpatrick's very interesting case, nearly a year after the dose was taken, whilst the left eye showed a widely dilated and fixed pupil. A similar state of affairs has been

recorded after still longer periods, viz., 1½ years (Harbridge), 2 years (Welton), and 5 years (Knapp). In Bruns' two cases there was slight dilatation of the pupil 10 and 17 years respectively after the poisoning.

A few points of interest remain to be recorded. In Knapp's case above mentioned the pupils responded to accommodation but not to light. In Hobby's patient, the pupils though widely dilated, reacted to eserine. Contraction instead of dilatation of the pupil has been described by Roberts, whilst Shahan noted active elliptical pupils on the 18th day after a very large dose of quinin had been taken.

**THE OPHTHALMOSCOPIC CHANGES OBSERVED.**—The most characteristic of these are pallor of the optic discs, and extreme contraction of the arteries and veins of the retina. These two phenomena recur with monotonous regularity in all the reports. The appearance of the nerve head is such as to suggest advanced atrophy; the pallor is striking, and the edges of the disc stand out by contrast with great sharpness against the surrounding fundus. The retinal blood supply is so greatly diminished that its vessels, and especially its arteries can sometimes be traced but a very short distance out from the disc edges. The next most frequent of the signs observed have been those of a cherry spot at the macula and of retinal edema (Berger, Buller, Gruening, Reina, Seligsohn, von Speyr, Weeks and Zani). Reina and Weeks differ from the other observers in describing the macula as reddish, and as brownish-red, respectively. Weeks explains this peculiarity in color as due to the absence of edema at the fovea. He points out that the absence of the vivid cherry color, found in obstruction of the central artery, is due to an ischemia of the choroid as well as of the retina, the former resulting from the action of quinin on the choroidal vessels. The absence of a free flow of arterial blood, in his opinion, causes the fovea to lose much of the vividness of color it would otherwise possess. Nettleship, in a case seen two months after the poisoning, found a certain degree of retinal edema, whilst Gruening observed the characteristic macular phenomenon and the surround-

ing edema disappear in 9 days. A few surgeons have recorded a thickening of the arterial walls presenting itself in the form of white streaks which run along the vessels (Bruner, de Schweinitz, Moulton, Parker, Reina, Seligsohn, Terrien and Aubineau, Uhthoff and von Speyer).

Fundus changes, indicative of inflammatory action, have been recorded by a few observers. These include retinal changes (Buller, Demichieri, Keiper, Parker and Zanotti); hazy edges to the papillae (Ballantyne, Bietti and Roberts); and choked disc (Dickinson, Zani and, doubtfully, Terrien and Aubineau). The columns of blood in the retinal vessels were observed to be broken in Parker's case; and retinal arterial pulsation was recorded by Buller and Manolescu; Parker reported a thrombus in a branch of a retinal vein in each eye; Kirkpatrick found one nasal artery in each eye much thickened, almost obliterated and partly covered by a hyalin mass as it crossed the edge of the disc. It is possible, if not probable, that some of these rarer changes are accidental, and have no connection with the quinin poisoning.

There is a point of very great interest, which we shall merely mention here, but hope to return to at greater length in discussing the etiology of the affection, viz., that there are indisputable cases on record, in which quinin amaurosis is present in the absence of the characteristic ophthalmoscopic appearances which we associate with this condition (Ballantyne, Webster Fox, Garofolo, Hamlich, Jodko, Kaz, Mantendam, von Graefe and Wilbrand). This observation increases in interest from the fact that a similar experience has been met with in dogs (de Schweinitz).

**UNUSUAL EYE SYMPTOMS.**—The following unusual phenomena have been met with:

(1) *Unilaterality of the affection* (Browne, Hobby, Kirkpatrick, von Graefe and Westhoff). These cases all differed from one another, but at the same time had this in common that some one or more of the features of the condition (dilatation of the pupil, ophthalmoscopic appearances, central visual acuity, visual



fields, etc.), were better marked in one eye than in the other.

(2) *Alterations in Sensation*.—An anesthesia of the conjunctiva was met with by Barabaschew and Belsky, and of the conjunctiva and cornea by Voorhies, whilst Parker's case presented a hazy and hyperesthetic cornea. Both Barabaschew and Parker noted hypotonus associated with the above conditions. In Stasinski's case also a lowering of the ocular tension was present. Tiffany records a case with hypotonus.

(3) *Affections of the Muscles*.—Atkinson observed lid spasm; Browne, Claiborne, Diez, Gimlette, Knapp, Peña and Wilbrand record evidence of pareses or paralysis of the ocular muscles; Mosso met with paresis of accommodation. Nystagmus was observed by Jodko, Knapp, Roosa and Williams; in Knapp's case it was vertical and vibratory and was associated with periodic divergence of the right eye. De Schweinitz also observed nystagmus in animals poisoned by quinin.

*AURAL SYMPTOMS*.—It has been mentioned that deafness is an early and troublesome sign of quinin poisoning. As a rule, it passes off quickly and completely. Williams, however, records a case in which the hearing was never wholly recovered, and it seems likely that many more such have been missed. In view of what has been found in connection with vision, and bearing in mind the similarity of the attack by quinin on these two special senses, one cannot help thinking that, if the hearing of a number of these cases were very carefully tested, evidence would be forthcoming of some permanent damage in a definite percentage of them. With the deafness is associated a variable and often distressing amount of tinnitus, and a feeling of fullness of the head. More rarely there is definite headache, which occasionally may be extremely severe. Giddiness, or dizziness, makes a not very infrequent appearance in the notes, tho probably it is a symptom, which is often missed, or belittled. It remains to mention Welton's very unusual case in which there was no tinnitus or deafness, and in which the patient's mental condition remained clear,

although the vision was profoundly affected. Roosa and Ely's experience was allied to Welton's, inasmuch as aural symptoms were conspicuous by their absence, but on the other hand, delirium was present.

*GENERAL SYMPTOMS OF QUININ POISONING*.—In a number of the cases of quinin poisoning by massive doses, one of the earliest notes concerns the recovery of the patient from a state of coma or of profound sleep, and the observation, at this time, of blindness, or at least of serious visual defects. This suggests, either that the patients fall off to sleep as a result of the administration of the drug, or that the condition is often so serious as to render routine clinical observation difficult. In any case, it is clear that very heavy sleep, and often a condition of coma, which may last for several days, are to be expected. More rarely, the patient is described as answering slowly, or as being in a state of drowsiness or of stupor (Manolescu). On the other hand, an irritable cerebral condition may be present characterized by troublesome delirium or by visual hallucinations (de Schweinitz, Gimlette, Laveran, Parker, Roosa and Ely). Manolescu records a case in which there was want of control over movements, and Myer one in which the patient lost the use of his arms and legs. Gruening's patient had a convulsive attack, whilst comatose. Respiration may be very shallow and death may be brought about by respiratory embarrassment. Cardiac failure is another grave danger, which may lead to fatal results. Gastro-intestinal symptoms are not wanting; vomiting and diarrhea are frequently mentioned. The former may come on at an early stage, and be obviously due to direct irritation of the gastric mucous membrane; later it may be very troublesome and is then probably cerebral. The stools and urine may be voided unconsciously.

It will be clear from the foregoing statements that it is only too easy to confuse the signs and symptoms of quinin poisoning with those of the various severe fevers, for the cure of which the drug is administered. From a perusal of the available records, it is obvious that this has been sometimes done, with the



result that the drug has been pressed at a time when it should have been altogether withdrawn. The tragedy of such a mistake is all the greater in children, in some of whom it would appear that it took days before it was discovered that the so-called treatment was the real cause of the trouble. These little patients paid by lifelong blindness—the

penalty of the doctor's error. Such disasters should be relegated to the limbo of an unforgotten past. Any hesitation as to the diagnosis should be banished from the mind by an examination of the widely dilated pupils and by an observation of the extreme retinal ischemia, which is almost uniformly present.

*(To Be Continued)*

## NEUROFIBROMATOSIS OF THE ORBIT.

C. ARBUTHNOT CAMPBELL, M. D.

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History of a case of multiple neurofibromatosis, with illustration showing orbital involvement. Operation and result.

Neurofibromatosis of the orbit is rare, especially with simultaneous involvement of the optic nerve. In the following case of general neurofibromatosis with orbital involvement, two masses were removed from the supraorbital nerve and one mass remains deep in the orbit, which may or may not arise from the optic nerve.

The following clinical picture points to optic nerve involvement: (1) Marked exophthalmos and ptosis. (2) Mobility of the eye is good in all directions. (3) Vitreous opacities. (4) After tumor masses were removed from the supraorbital nerve the pain disappeared. To strengthen our suspicion that the tumor is not attached to the optic nerve the following findings are of importance: (1) Vision 4/10 increased to 4/4 with correction. (2) Absence of optic neuritis and atrophy. (3) Absence of high grade or even moderate venous engorgement. In a case so dubious, a positive diagnosis can only be made when the symptoms become more definite, or enucleation with section reveals the true origin of nerve attachment, and whether it is intradural or extradural to that nerve. Personally I am strongly inclined to the extradural non-optic nerve diagnosis.

### CASE.

Mr. P. U. Age 42 years. Married. Occupation, janitor. Habitat: Thru northern Michigan. Referred by Dr. Jones of Bay City. Diagnosis: General neurofibromatosis (Recklinghausen's disease, neuroma plexiforme). Diagnosis based on the pathologic report and the clinical findings.

Previous health has always been good excepting the diseases of childhood. No history of head injuries. Denies all venereal diseases. Weight 150 pounds; height 5 feet 11 inches. Has lost some weight during the past couple of years. Urine negative. Leucocytes 7800. Erythrocytes 4,000,000. Hemoglobin 75% (Sahli). Wassermann negative. Physical examination negative for chest and abdomen, except scars resulting from previous operations. No paralysis but there are restricted movements due to scar tissue contractions, the results of the operations. Some tingling in the fingers of the left hand. The left forearm has had many growths removed four or five times.

Character of the Patient.—Clear minded, intelligent, not neurasthenic.

Chief Complaint.—Intense pain in left eye, more or less continuous, with quies-

cent intervals of partial and complete relief, to be followed by an onset of pain increasing in intensity till it crushed his morale and produced a state of abandonment where he gladly would part with the eye to obtain relief. But all attacks did not rise to this grade in severity. There was no discoverable cause for the paroxysms. On his own initiative he suggested enucleation if necessary.

**HISTORY OF PRESENT CONDITION.**—Began about 23 years ago, with removal of superficial tumors from the forehead and left wrist. Since then he has tried many forms of non-operative treatment without success. Six years after the first operation he again had some masses removed. Now he has the tumors removed every two years but they are becoming more frequent, larger and more deeply situated. For the past four years has had increasing pain in the left eye and toothache. But during the last six months the toothache has disappeared, altho pain in the left eye has become excruciating.

The exophthalmos and ptosis began very gradually two years ago. At present, 3 mm. of conjunctiva is exposed when the lids are closed. The photograph shows the marked exophthalmos and proptosis with the margin of the lower lid of the right eye on the same level with the margin of the upper lid of the left. Palpation readily causes tenderness of the tumors. These masses are felt beneath the upper lid between the ball and the margin of the supra-orbital arch, in the midline; and seem to be 10 mm. by 10 mm. in size. No increase of tension. Vision: R.  $\frac{4}{5}$  and L.  $\frac{4}{10}$ , increased to  $\frac{4}{4}$  by  $-50$  Sph. with  $-50$  Cyl. axis  $105^\circ$ . The fundus of the L. showed the disc slightly pale and veins little enlarged. These were the only findings.

**OPERATION.**—Ether anesthesia. Incision thru shaved eyebrow. Dissection down to first tumor which was excised. Second mass, slightly deeper, was also removed. Both of these were attached to the supraorbital nerve. The third mass was deeply situated. It could be touched with the finger, but no attempt was made to remove it, because of its

depth and possible attachments and the dangers of dissecting, by the sense of touch. The wound was sutured with horse hair.

Recovery uneventful. No pain or tenderness.

**RESULTS OF OPERATION.**—(1)—Absolutely no pain. (2) Some reduction of



FIG. 1.

Neurofibromatosis of Orbit. Campbell's case showing eyeball pushed down and forward by growth in orbit.

the exophthalmos and proptosis. (3) Two neurofibromata removed. (4) The knowledge that removal of the remaining tumor will necessitate enucleation. This mass remaining in the orbit apparently causes no symptoms, except the exophthalmos and proptosis.

Subsequent result of operation, ten months later.—The pain has not returned to the left eye, but intense itching at the scar site occurs in paroxysms. Headache when using eyes for close work over a prolonged period, but this stops when the eyes have been given a rest. The exophthalmos and proptosis have somewhat increased. No contraction of

the visual field. Patient sees several spots before the left eye. The fundus shows nothing; but the vitreous has several small rapidly precipitating, dark floaters. Vision 4/6 correction with a plus 0.50 sph. and a plus 0.50 cyl. axis 30° gives 4/4. Tension not increased.

The corneoscleral margin is exposed about 5 mm.; this is an increase of 2 mm. over what was exposed before the operation.

The prognosis as I see it, is ultimate destruction of the eye by a keratitis due to corneal exposure.

## CONJUNCTIVITIS OF THE FORNIX.

BY DR. JUAN SANTOS FERNANDEZ.

HAVANA, CUBA.

This paper calls attention to a condition characterized by serous infiltration and protrusion of the conjunctiva of the fornix; and reports an illustrative case.

The fornix, as is well known, forms that portion of the conjunctiva (from conjugere, to unite), lying between the bulbar and the tarsal conjunctiva, the *culdesac*, of the French authors and the *fornix* of the anatomists.

Surely the division of the conjunctiva into four regions, tarsal, bulbar, fornix and lacrimal, responds to histologic differentiations, as well as anatomic, functional and pathologic ones, but the anatomic interest is almost nil. Some authors study separately these four regions and on describing the fornix call attention to the dangers that it may present, as in ophthalmia neonatorum, in some cases of which the secretion may be accumulated in considerable amount thus preventing the curative effect of the drugs used to combat the disease.

Outside of what we have stated, few authors really call any attention to the fornix as the seat of any disturbance, and as we have been observing in Cuba for a long time a special alteration of not well defined status but with its own characteristics, in the fornix, we try now to describe it; and want to call attention to this pathologic entity that we have named conjunctivitis of the fornix. Not a few times it has been called trachoma and some cases have been operated as such without any injury to the patient, even if the cases were not of trachoma,

because it is an inflammatory disease that can be attacked in different ways.

The conjunctivitis of the fornix is a lesion confined to the region mentioned. We believe that these cases must have some relation, not yet well defined, to the climate of this country, or to the general condition of the child suffering the disease. The anemia thought to be frequent in these patients has not been proved by the blood findings. In regard to this we have published a long time ago some statistics of eye patients in Cuba; and we proved that trachoma was not very frequent here until after the war, and the coming into Cuba of many thousands of immigrants. We have also written more than once concerning the existence of false trachoma<sup>1</sup> and have shown that in spite of the strictness of the health authorities in the ports, especially at Havana, some cases of trachoma enter the Island of Cuba. The diagnosis of trachoma is really very difficult and only by the observance of the course taken by the disease can it sometimes be diagnosed. On that account we are always cautious when giving a diagnosis of trachoma especially when there is some legal matter involved in that connection.

Axenfeld<sup>2</sup> was undoubtedly right when he said that the diagnosis of some troubles of the conjunctiva was a difficult matter, met only by means of a meth-



odic examination, that should be made for some time before giving out a diagnosis that there is some especial disease or a combination of diseases. In the same way there have been some opinions concerning whether trachoma is due to one cause only, a germ for example, or to several causes. These doubts cease in the case of a special infection, like the one produced by the Klebs-Loeffler bacillus, or the gonococcus.

Referring again to the conjunctivitis of the fornix, although our cases have been seen by the hundreds, we describe only one case from the many we have seen lately, chosen because it is typical.

CASE.—J. N. M., a great grandson of a lady that had been operated by me for cataracts in 1875, was brought to me by his father. The patient was a boy nine years old, and the father told us that for the past two years he had been noticing something abnormal about the boy's eyes. No pain, and very slight lacrimation at times. But what called the attention of the parents was the constant twitching of the eyelids, lasting sometimes fifteen minutes, and done in spite of the efforts made by the boy not to do it. We shall afterwards give our opinion of this twitching. In order to ascertain the cause of it, we everted the upper lids and found the conjunctiva of the tarsus in normal state with slight asthenic decoloration.

On asking the boy to contract the lids (the upper one being everted), the phenomenon that was seen is the pivotal axis of this paper. When the patient made the contraction asked, there was produced an eventration or hernia of the conjunctiva of the fornix, that appeared like a small white tumor in between the space limited by the lower border of the cartilage and the eyeball, and this proved to be the conjunctiva of the fornix, inflamed and edematous, of pale red color and showing some venous predominance or asthenic aspect, the size being that of a small horse bean.

There was a very slight secretion and the bacteriologic examination revealed no special microorganisms, outside of the common ones found in the

normal conjunctiva, like Koch-Weeks' bacillus, streptococcus, the diplobacillus of Morax-Axenfeld and other germs, none of which had any relation to the present disease.

The father of the boy had seen another specialist who had recommended an intervention, believing the disease to be trachoma; and the patient had to leave the Island to go north. We told him that if the trip was to be done immediately, the best course would be the rapid surgical intervention, but that in case the trip was going to be delayed, the medical treatment would be satisfactory; and as the parents decided to delay their trip we began to treat the patient locally. The belief that the patient was anemic, and the fact that he had had an operation on the nose some time before, made us order the blood examined several times. The average results were: Red corpuscles, 5,200,000; hemoglobin, 85%. The fact that the same results were obtained in many cases allowed us to discard anemia as a probable factor in the etiology. The case described was cured very rapidly with the medical procedures used.

The two salient symptoms of the "Conjunctivitis of the Fornix," are the twitching of the eyelids, and the protrusion of the inflamed or infiltrated fornix. The latter, it can be clearly seen, is not a conjunctivitis, but a serous infiltration of the conjunctiva of the fornix, of possible lymphatic origin, giving rise to the swelling noticed<sup>3</sup>. The small tumor appears in the lax fold formed by the conjunctiva of the posterior culdesac. That is why it appears as a swelling or tumor in the space between the cartilage and the eyeball. As there is no great inflammation, there are no inflammatory symptoms, and the effect produced by the inflamed fornix is like a foreign body; without any pain and exciting only the contraction of the lids, this being the first symptom noticed in the patients, who are generally children.

What the authors say regarding the structure of the culdesac is in favor of our explanation that the matter is an

infiltration of the fornix. It is admitted that the conjunctiva of that region extends from the zone where it is adherent to the tarsus, to the level where it comes in connection with the periscleral tissue. The upper or lower border of the cartilage, as we have said, allows us to give a precise and fixed limit to the conjunctiva of the region mentioned. The macroscopic aspect is changed naturally from this point on, and being smooth at first becomes afterwards more rugged and less uniform, there being some folds that have a horizontal direction and that are well marked in some pathologic conditions, the same not being present in fetal life. These folds greatly facilitate the motions of the eyeballs, and they are taken into account when one is going to operate. Through the upper fold the extirpation of the lacrimal gland is done and through the lower one the levator palpebral muscle is sought when the Motais or Parinaud's operation for ptosis is to be practiced; the same way also when the extirpation of the culdesac is needed.

The most important reason we have to pay attention to this subject is to differentiate it from trachoma and as we have already said, since the beginning of the American intervention in Cuba, in 1899, we called attention to the frequent errors made in diagnosis, for many such cases were taken as trachoma<sup>4</sup>. We believed that these errors, altho not to be approved scientifically, were beneficial from a sanitary standpoint as in that way no true cases of trachoma could be smuggled in, and because we believed that those children were more amenable to contract trachoma than healthy ones. From a scientific point of view, however, we could not agree with the sanitary opinion, for most of those cases were really

not due to trachoma; and besides, in Cuba there is very rarely seen those severe scrofulous conjunctivitis that are so intense in the cold climates.

In Cuba the lymphatic manifestations of the eyes are very moderate and tend to appear as if due to anemia, as we thought at first, but have changed our view since then. The languor that is believed to be very common here and in all tropical countries, and that has been thought to have influences even of a psychic strain, as stated by a distinguished Argentine writer (Ingenieros), but combated by Dr. Diego Tamayo and others, has no very marked influence. But there must be allowed some influence to the extreme heat, the nervous excitation and the mixture with some inferior races, which to some extent are factors to be taken into consideration.

CONCLUSIONS.—1. The affection of the fornix we have described appears to be more of an infiltration than an inflammation. The infiltration being in the conjunctiva of the culdesac, more loose there than in other places and probably due to a slight manifestation of lymphatism.

2. It is absolutely unrelated to trachoma in its various manifestations.

3. It is not contagious, but might safely be so considered, because even if it does not transmit any infection, the patients are subject to being infected with great ease. This fact has been the cause of many errors of diagnosis.

4. The local treatment is the same as for any simple conjunctivitis, preferring the antiseptics in order to avoid the secondary infections. The general treatment has to be dependent on hygienic rules, allowing the small patients plenty of fresh air, either at the seashore or in the mountains.

#### BIBLIOGRAPHY.

1. Cron. Med. Quirurg. de la Habana, v. 9, p. 643.
2. Axenfeld. A Treatise on Ophthalmology, p. 338 -X.
3. Cron.-Med. Quirurgica de la Habana, v. 38, p. 425.
4. Anales de Oftalmologia, Mexico, v. 6, p. 305.
5. Treatment of granular conjunctivitis by excision of the culdesac. Cron. Oftal. de Cadiz, Spain, v. 8, p. 30, 1880.
6. Treatment of granulations (trachoma) with jequirity. Cron. Med. Quir. de la Habana, v. 10, p. 287, 1884.

7. Accidents that may arise from the use of jequirity. *Cron. Med. Quir.*, vol. XI, p. 196-202.
8. Peony. *Anales de la Academia de Ciencias*, vol. XXI, p. 530-531.
9. How a catarrhal conjunctivitis may be converted into a purulent. *Cron. Med. Quir.*, vol. XVII, p. 276-279.
10. Ocular germs in the physiologic state. *Cron. Med. Quir.*, vol. XVII, p. 136. *Anales de la Academia de Ciencias*, vol. XXVII, p. 556-557.
11. Potassium cantharidate in the treatment of granulations (Trachoma). *Progreso Médico de la Habana*, vol. II, p. 155. (1891.)
12. Absence of trachome chez le negro. *Rev. d'Ophthalmologie*. Paris, vol. XII, p. 395. (1895.)
13. The new treatments of granular conjunctivitis (trachoma). *Gaceta Medica*. Catalana-Barcelona, Spain, vol. XIV, p. 447. (1901.)
14. Subconjunctival injections of potassium permanganat in the fornix, in trachoma. (Second Pan American Medical Congress, Mexico.) *Memoirs of the Congress*, vol. II, p. 632-637. (1897.)
15. Le trachoma a l'Ille de Cuba. *Bulletin de la Société Française d'Ophthalmologie*. Paris, p. 333-341. (1896.)
16. Purulent conjunctivitis of the newly born. *Anales de la Academia de Ciencias de la Habana*, vol. XXXV, p. 11-18. *Cron. Med. Quir.*, vol. XXIV, p. 97. *Bulletin de la Société Française de Ophthalmologie*, Paris, vol. XI, p. 49-53.
17. A case that explains one of the ways of contagion in granulations (trachoma). *Cron. Med. Quir.*, vol. XXIV, p. 369.
18. Prognosis of ophthalmia neonatorum. *Archivos de la Sociedad de Estudios Clinicos de la Habana*, vol. IX, p. 43-47. *Cron. Med. Quir.*, vol. XXV, p. 91-93.
19. Trachoma in the east of Cuba. *Anales de la Academia de Ciencias*, vol. XLIII, p. 221-223. (1901.)
20. External ocular disturbances due to tobacco. *Cron. Med. Quir.*, vol. XXVII, p. 508-514. (March, 1902.)
21. Increase of trachoma in Cuba in spite of unfavorable causes for its dissemination. *Cron. Med. Quir.*, vol. XXXIV, p. 247.
22. Difficulties for the diagnosis of trachoma among immigrants. *Cron. Med. Quir.*, vol. XXXV, p. 489.
23. New observation concerning trachoma in Cuba. *Cron. Med. Quir.*, vol. XXXVII, p. 524-530. (1911.)
24. Eye disease in school children. *Cron. Med. Quir.*, vol. XXXIX, p. 561-564.
25. Notes about false trachoma in Cuba. *Cron. Med. Quir.*, vol. XXXIX, p. 643-644.
26. Peculiar course of some lymphatic ocular diseases of the children in Cuba. *Cron. Med. Quir.*, vol. XL, p. 425-430. (1912.)
27. Prophylaxis of trachoma in Cuba. *Cron. Med. Quir.*, vol. XL, p. 195.
28. Can trachoma be cured? Ophthalmological Congress of Valencia, Spain, September, 1916. *Archivos de Oftalmología Hispano-Americanos*, vol. XVII, p. 53.
29. Keratitis and conjunctivitis caused by a toad (*Bufo vulgaris*). *Anales de oftalmología*. Mexico, vol. V., p. 101-105. Oct., 1902.
30. The staphylococcus pyogenes albus in the conjunctivae. *Cron. Med. Quir.*, vol. XXIX, p. 337.
31. Granular conjunctivitis in Cuba. *Archivos de la Sociedad de Estudios. Clinicos*, vol. XII, p. 353-361.
32. How should granulations be treated (trachoma). *Anales de la Academia de Ciencias de la Habana*, vol. XL, p. 430.
33. Statistics of trachoma in Cuba. *Anales de Oftalmología*, Mexico, vol. XI, p. 305-313. (Jan., 1904.)
34. The diagnosis of conjunctival diseases with the help of the laboratory. *Archivos de la Sociedad de Estudios Clínicos*, vol. XIII, p. 112. *Cron. Med. Quir.*, vol. XXXI, p. 163.
35. The prophylaxis of trachoma in Cuba in its relation to immigration. *Cron. Med. Quir.*, vol. XXXIII, p. 117-124.
36. The prophylaxis of trachoma in Cuba based in the supervision of the immigrants. *Revista de Medicina y Cirugía de la Habana*, vol. XII, p. 327. (June, 1907.)



# HOMOLOGOUS CORNEAL TRANSPLANT.

ANCIL MARTIN, M. D.

PHOENIX, ARIZONA.

Report of a case of corneal transplantation in which the whole thickness of the cornea was replaced by the cornea from an eye about to be enucleated. Read before the meeting of the Arizona State Medical Association, April 25, 1918.

After reading the excellent history of corneal transplants and grafts presented by Dr. Sydney Walker, Jr., at the last meeting of the American Medical Association, I am instigated to present my personal experience and views on the subject of the homologous corneal transplant.

My work along this line has not been successful from a visual standpoint, but nevertheless it has some value in demonstrating the vitality of the eye structures. Furthermore, it presents some new points in operative technic, which may be of assistance to others who are experimenting with corneal transplant. I feel confident that ultimately thru operation by corneal transplant or graft, a successful method for restoring the vision of those blind from dense corneal macula will be evolved. We should be encouraged in our efforts when we consider that in the course of surgical evolution, a successful method for cure of many supposedly inoperable bodily defects has been demonstrated.

## REPORT OF A CASE.

N. V.; Miner. Blasted April 4, 1915. Seen August 12, 1915. Left eye lost, phthisis bulbi. Right eye, a marked fullness of the conjunctival vessels, moderate ciliary injection and tenderness. Dense corneal leucoma. There remained a small area of cornea, about 2 mm. in width, near the upper sclero-corneal margin which was less dense, and thru which an indistinct view of the iris was had. Fine vessels covered the entire corneal surface. Tension —1. Pupil undoubtedly occluded.

Again seen April 16, 1917. Vision in the right eye, light perception only. A small area of the superior portion of the cornea, near the limbus, was relatively clear; and at that locality an iridectomy

was performed. The result was perception of hand movements, when the upper lid was elevated with the finger. This amount of vision being of no value, a corneal transplantation was performed, under the following technic.

By means of a hypodermic syringe the conjunctiva of the globe was ballooned with normal salt solution, and a division of it was made at its sclerocorneal insertion. The pouchlike conjunctival sac could then easily be drawn together over the cornea. Three mattress sutures were placed but not tied. An instrument having the diameter of 8 mm. was used to trephine the cornea. The degenerated iris was found adherent to the lens capsule, the lens cortex having been absorbed. The capsule, together with the remains of the iris, was gently drawn forward and excised with scissors, which procedure exposed the vitreous.

Using the same trephine, a corneal transplant was removed from the eye of another patient, whose eye was to be enucleated because of the presence of a rock within the globe; a negative Wassermann having first been demonstrated. The transplant was transferred to the eye of the first patient, where it readily adapted itself to its new position. No corneal sutures were used. The conjunctival sutures were then tied, burying the transplant within the conjunctival sac.

On the seventh day the eye was dressed. The sutures had cut loose and the conjunctiva was retracted, exposing the new cornea. With the nourishment furnished by the conjunctival flap, the transplant was alive and continued so, although it was found to be opaque. After two months the corneal opacity was somewhat cleared, so that the patient was able to discern hand movements. Tension was normal. At this time he returned to Old Mexico.

On the 20th of April, 1918, I received a communication from the chief surgeon of the mining company, in whose employ this patient had been at the time of the receipt of his injury, stating that "the corneal transplant is translucent and patient has slight perception of light."

#### REMARKS.

The features of this operation were the large size of the transplant. The method of dissecting the conjunctiva by ballooning, in its use as a support to hold the transplant in position. The use of the conjunctiva to quickly close the annular wound, and to aid in nourishing the transplant during the first week. Finally the removal of the iris and the lens capsule.

It has been the history of the major number of corneal transplants that opacity has supervened. This, without doubt, is due to the entrance of the aqueous into the interstices of the laminated corneal structure; causing a swelling of the tissues. Although the corneal laminae are more or less continuous with those of the sclera, nevertheless the thought suggests itself that a trephine large enough to divide the eye capsule just without the true corneal structure may pass thru tissues which will not readily admit fluids into the corneal parenchyma.

Working upon this idea, numerous operations were performed upon the cadaver. Another corneal trephine was secured, having a diameter of 13 mm., so arranged that the plunger can be set to limit the incision to any desired depth, and this should be set at a

little less than 2 mm. In its use the section is not always completed in the entire corneal circumference—in fact, it is usually necessary to raise the cornea gently and complete the excision by means of curved iris scissors, carefully following the line of incision made by the blade of the trephine.

The next step is the removal of the iris, which is accomplished by passing one blade of a flat forceps, beneath the iris, grasping it and with gentle traction, divulsing the iris from its origin, exposing the ciliary body and leaving the lens in place.

If the lens is found opaque, or becomes opaque following the operation, it is proposed that extraction may at a later period be made in the usual manner. The removal of the iris is done with the purpose of avoiding postoperative iritis and its consequences.

The transplant removed from the eye of the second patient, is placed in situ. The sutures, which have been previously introduced into the ballooned conjunctiva, as outlined in the description given in the case report in the early part of this article, are then gently tied, the conjunctiva thus covering the entire cornea.

The operation is very readily performed upon the cadaver, in which the ocular tension is decidedly minus; and should more easily be performed upon the live subject having normal tension. It is not expected that the result will produce a perfect visual organ. Should the cornea remain clear, as we hope it may, some degree of useful vision would follow.

## IRIDECTOMY FOR OPTICAL PURPOSES.

J. H. McKELLAR, M. D.

LOS ANGELES, CALIFORNIA.

A discussion of the indications and technic of optical iridectomy with report of two favorable cases.

Iridectomy is performed for one of two purposes, either as a therapeutic measure, or as an optical measure to improve sight. The latter, or optical

iridectomy, is considered in this short paper. The operation consists in removing a piece of iris in such a position that rays of light are admitted

thru clear media. It is usually done because the path of light which normally passes thru the pupil is obstructed as the result of a disease process, that is, when there is an opacity of one of the media and that opacity is in the pupillary area.

INDICATIONS.—1. Any obstruction to the before mentioned path of the light thru the pupil, which is permanent in character, and of such extent as to render the eye unserviceable for vision; in an eye where such obstruction may be avoided by removing a section of iris, giving a new path for the rays of light entering the eye. It should only be done if the vision is decidedly reduced as a result of the obstruction.

The most usual of these obstructions are leucoma, the result of corneal ulcer, or interstitial inflammation of the cornea; pupillary membrane following iritis or iridocyclitis; or central cataract. The eye should be free from inflammation, as otherwise, especially in pupillary membrane, the opening is apt to fill with exudate after the operation. For pupillary membrane, it is well to postpone the operation for at least a year from the time the eye becomes quiet.

2. Rarely in marked displacement of the pupil, due to incarceration of the iris.

These indications only hold good if the vitreous is presumably clear, and if the retina and optic nerve are in good condition. This may be determined by testing the patient's light perception, and light projection. When only quantitative vision is present, the test may be made by means of a lighted candle in a darkened room. The patient should be able to point out the position of the candle readily, as the most dense opacity of cornea or lens will not cause loss of ability to locate a source of light. The limits of the visual field may also be determined with the candle, and should be normal, or nearly so in extent. The amount of vision should correspond approximately to the degree and position of the obstruction.

CONTRAINDICATIONS.—1. When light perception, and light projection are deficient, or absent; also when the field

of vision is much contracted without increased tension.

2. Where the eye is abnormally soft, or small, or the cornea flat, as these conditions usually indicate diseased conditions back of lens.

3. Strabismus which has lasted for a considerable number of years in the eye in which the opacity is present. In such a case amblyopia ex anopsia is almost surely present; and the result will be probably disappointing, tho the operation might be tried if the case be otherwise visually hopeless.

4. Where no reasonably clear path for the entering rays can be secured.

5. When inflammation of the eye exists.

OPERATION.—The operation does not differ materially from the therapeutic iridectomy, excepting that the portion of the iris removed is usually narrower, and does not extend back to the root of the iris. To make such a coloboma the section should be short and not extend back of the limbus. Such an opening limits the dazzling, and also the irregular refraction, and prismatic action of the margin of the lens. The position of the iridectomy in opacity of the cornea must depend upon the area of the cornea most transparent. If the opacity is central, and the periphery is all equally clear, my own choice is upward, altho this seems to be contrary to the teaching of authorities, as in this position the deformity is least apparent, and the amount of light entering the eye can be readily regulated by the action of the upper lid. If the iris is adherent to the lens capsule one must be exceedingly careful in stripping it off with the iris forceps, not to injure the lens. In making the section the keratome must incise the cornea almost at right angles, never obliquely splitting the corneal layers, as in this case a new opacity is apt to be formed over the coloboma.

RESULTS.—Too much should not be promised to the patient for, even tho an unobstructed path be secured for the rays entering the eye thru the eccentric pupil, there is almost certain to be a marked astigmatism, more or less irregular, especially if the iridec-



tomy is placed in the extreme periphery. Yet in carefully selected cases, the visual result is decidedly gratifying.

The prognosis as to vision depends upon the location and density of the opacity, and the general condition of the eye, especially upon the functional condition of the retina, and optic nerve. The intraocular tension must also be considered. The visual result is apt to be better if the obstruction in the pupillary area is very dense, and strictly localized; and in a central scar of the cornea, tattooing may obviate some of the dazzling after the operation. If there is a pupillary membrane due to an old iridocyclitis, the result may be disappointing. The segment of iris may be removed, but the pigment layer will sometimes remain adherent to the lens. The deformity owing to the defect in the iris is not great, and if above is scarcely noticeable. Some times dilating the pupil to its maximum, if it is not bound down, will give some indication as to what may be expected as a result of the operation. If the pupil is seclused, and occluded, and secondary glaucoma is present, the iridectomy may relieve the increased tension in addition to its optical effect.

The line of vision is not changed unless the new pupil is very peripheral, in which case the prismatic action of the edge of the lens may displace the visual field downward.

#### CASES.

Case 1.—Mr. J. F. L., age 51. Had an operation on his left eye when 24 years of age. Right eye became affected two years afterward, presumably by sympathetic inflammation. Since 29 years of age he has been practically blind. Examination: Patient healthy. No history of tuberculosis or

syphilis. Wassermann negative. Right eye. Lids normal. Pupil, nearly seclused and occluded, central lenticular opacity apparently. Tension normal. Vision: Can distinguish outlines of large objects in a good light with great difficulty. Practically little more than light perception.

Left eye: Phthisis bulbi.

Operation: Iridectomy, above, in right eye. Iris adherent to lens except at periphery. Iris pigment remained adherent to lens except at periphery.

Result: Patient has astigmatism of about 7 diopters, sees to get about, and do some work. Can read large type, and tell the time by his watch. In this case the iridectomy was of necessity very peripheral, and the visual field is projected downward unless the patient wears a strong prism base up.

CASE 2.—Mrs. S. E. J. Age 44. Vision has been very poor since her earliest recollection. Of late years the condition has been worse. Examination: Patient a deaf mute, healthy, has no tuberculosis or specific history. Lids healthy, dense scars of each cornea in pupillary area. Light perception and projection good in each eye. Pupils in each eye apparently seclused.

Vision: Right eye, light perception.

Left eye, fingers with difficulty at four feet.

Operation: Optical iridectomy upward in both eyes.

Result: Much better in right eye, as the iris in left eye was adherent to the lens, and the segment could not be cleanly removed. Patient has an astigmatism of about five diopters.

Distance vision about 20/40. Can read the finest type with or without glasses, and carries on a considerable correspondence with her friends.

Both of these patients have been restored from practical blindness to a condition of having serviceable vision.

#### REFERENCES.

- Fuchs—Ophthalmology.  
Weeks—Ophthalmology.  
Torok and Grout—Surgery of the Eye.

# APPARENT ACCOMMODATION IN APHAKIA.

WILLIAM ZENTMAYER, M. D.

PHILADELPHIA, PA.

Report of a case of such apparent accommodation, with discussion of the possible conditions that might account for it. Read before the Section on Ophthalmology of the College of Physicians of Philadelphia, March 21, 1918.

More than a century ago Thomas Young made investigations as to the existence of accommodative power in the aphakic eye and wrote that the results obtained, although inconclusive, indicated an absence of that function. Later von Graefe asserted that some accommodative power remained, but recognized that those who made the most accurate, and on repeated investigations, the most uniform statements, had the least range.

Donders<sup>1</sup> then took up the problem and tried to solve it by observing whether a change took place in the form of a distant point of light during convergence and concluded "that in aphakia not the slightest trace of accommodative power remains."

While these studies determined that accommodative power in the ordinary meaning of the term does not exist in eyes deprived of the crystalline lens, the fact remains that aphakic eyes may, and frequently do, have the inherent power of reading at varying distances with or without the lens which adapts the eye to parallel rays of light.

Literature contains the recital of a number of such cases and from the varying conditions which have been present numerous solutions of the problem have been offered.

Fuerst<sup>2</sup> found in 8 cases out of 20 of juvenile aphakic eyes, after congenital cataract or cataract acquired in the first years of life, a more or less considerable accommodative power present so that sometimes the entire amount of high grade H. of the emmetropic aphakic eyes (12-13 D.) for distance as well as near was compensated for.

Pfalz's<sup>3</sup> case of congenital dislocation of the lens had an apparent accommodation of 4 D.

In Landrieu's<sup>4</sup> case of aphakia in a boy of 9 years, operated upon. V. with  $+15\text{ D} = 5/6$  and type could be read at the usual reading distance.

Collins<sup>5</sup> case was a boy who was operated on at the age of 7 by repeated discissions, and at the age of 14 could read Jr. 1. fluently with his distance glass,  $+13\text{ D. S.}$

## CASE.

My own case is that of a girl 8 years of age with acquired cataract. Two needlings were fruitless in securing absorption, altho a bud of cortex protruded thru an opening in the capsule, so that for the third and final operation a broad needle was introduced thru the cornea, at the site of the capsular rent, and immediately vitreous came thru into the chamber, leaving a clear opening about 2 mm. long and 1 mm. wide surrounded by opaque lens matter. Thru this opening she has  $5/5\text{ V.}$  and reads 0.5 M. fluently to within 3 cm. of the cornea.

From painstaking investigations and from pure theorizing the following explanations have been evolved for this interesting and fortunate result.

1. That it is due to corneal astigmatism.
2. Increase in the index of the refractive media.
3. Partial regeneration of the lens, the functioning elements being forced into the pupillary space thru external muscle pressure. (Fuerst.)
4. From cutting off the circles of diffusion either by contraction of the pupil, by nipping of the lids or by a stenopaic opening in the secondary cataract.
5. Lengthening of the optic axis by contraction of the external muscles.

6. Forward bulging of the anterior surface of the vitreous, or an increase in corneal curvature by pressure of the external muscles.

7. Spherical aberration (largely compensated for by the lens in the normal condition) (Kröner).<sup>6</sup>

8. Thru adjustment of the cataract lens.

It is probably true, as Donder's asserts, that many who have written upon the subject have had no idea of the degree of distinctness of vision even in imperfect accommodation and that many of the cases of apparent accommodation may thus be explained.

Schmidt-Rimpler<sup>7</sup> states that with his own aphakic eye on close observation of single letters he finds vision to be perfectly sharp only at a single distance. I believe that many are unaware of the ability of an eye without accommodation to read without a glass very fine print up to within a few cm. of the cornea, thru a pin hole aperture in a card held close to the cornea (of course we are all aware of the fact that an uncorrected highly astigmatic eye can have normal vision thru a pin

hole). This ability to read by cutting down the circles of diffusion I believe explains my own case as Collins and also Landrieu explain their cases.

Other contributing factors are, no doubt, irregular astigmatism and also regular astigmatism, tho Kröner found that the region of accommodation does not correspond to the optical distances between the two foci; and that it is generally greater in eyes with little astigmatism and less in highly astigmatic eyes.

This author believes that in general it results from influences which by diminished visual acuity lessens the necessity of exact focussing. Fuerst believes it to be caused by a vicarious function from the pressure of the orbicularis and external muscles which develops sometimes after the operation and only when the correcting lenses have been withheld from the patient (this is disproved by Collins' case and also by my own), and further believes that it finds a certain analogue in isolated observations of abnormal refraction in eyes containing their crystalline lens.

#### BIBLIOGRAPHY.

1. Donders. Accommodation and Refraction of the Eye, p. 319.
2. Fuerst. Graefe's Arch. f. Ophth., v. 65, Ht. 1.
3. Pfalz. Zeit. f. Augenh., v. 25, p. 102.
4. Landrieu. La Clinique Ophthalmologique, v. 20, p. 203.
5. Collins. Ophthalmic Record, v. 24, p. 380.
6. Kröner. Zeit. f. Augenh., v. 24, p. 346.
7. Schmidt-Rimpler. Klin. Monatsbl. f. Augenh. 1911, 1, p. 692.

## NOTES, CASES, INSTRUMENTS

### OPHTHALMOPLÉGIA AND OPTIC NEURITIS.

Report of Cases.

FRANK A. MORRISON.

INDIANAPOLIS, IND.

#### OPHTHALMOPLÉGIA FOLLOWING PROPHYLACTIC DOSE OF ANTITOXIN.

Boy, age 7. History as given by the mother and grandmother. Last Sep-

tember one of the other children of the family was attacked by diphtheria. This boy was given a prophylactic injection of antitoxin. Three days later his eyelids began to droop, and have continued to do so up to this time, altho the mother thought at times they were better.

The child presented the ordinary picture of complete ophthalmoplegia. The mother persisted in the statement that



the child had never been sick and that nothing peculiar in its gait in walking, speech or swallowing had ever been noticed. Unfortunately it was not possible to communicate with the physician in attendance and the amount of antitoxin injected could not be learned. Diagnosis: uncertain, ophthalmoplegia possibly from antitoxin or possibly from a mild and unrecognized diphtheria or even the possibility of a mere coincidence must not be overlooked.

#### OPTIC NEURITIS WITH RECOVERY.

Girl twelve years of age. Had been perfectly well, but noticed one morning about a week before coming to my office that she could not see the largest writing on the blackboard at school, with her right eye, even when a few inches away. She was positive she could see when she went home the night before. This child was an unusually bright girl and mentioned several experiments which she had made in the way of testing her vision a few days before she discovered her condition. Her home surroundings had not been good and she had been subjected to a great deal of distress owing to the misconduct of her father. She had no headache, vomiting nor indeed symptoms of any kind. Reflexes all normal. No indication of paralysis or lack of co-ordination. Pupils responded to light and accommodation normally. Fundus of right eye showed typical choked disc of three diopters with a few retinal hemorrhages. Further questioning as to the possibility of injury brought out the fact that she had fallen upon her back a few days before the appearance of the eye symptoms; but she insisted she had not been hurt. Being pressed to tell just how she struck when she slipped she finally said, "Why I never thought of it but I don't believe I remember. Do you think I could have jarred my senses away?" There was no bruise upon the head or spine to indicate injury. She returned home in a neighboring town with a rather uncertain diagnosis relative to the cause of her condition and a still more uncertain prognosis.

A few weeks later she was sent to a hospital in this city for observation and again came under my notice. An examination of the fundus showed the same condition as when last seen but somewhat less marked. She was selected as one of the patients to have a mydriatic put into the eyes for class demonstration four days later. When she came before the class at the end of this period the fundus was almost normal and the improvement continued to complete recovery. While in the hospital X-ray pictures of the head showed in the language of the resident surgeon "a faint shadow in the occipital region which might indicate a slight fracture."

#### CASE OF HOLE IN DISC.

CHARLES B. HARWOOD, M. D.

HOUSTON, TEXAS.

The patient, Mr. K., aged 28, had vision in the right eye of 20/200. Ophthalmoscopic examination of the right

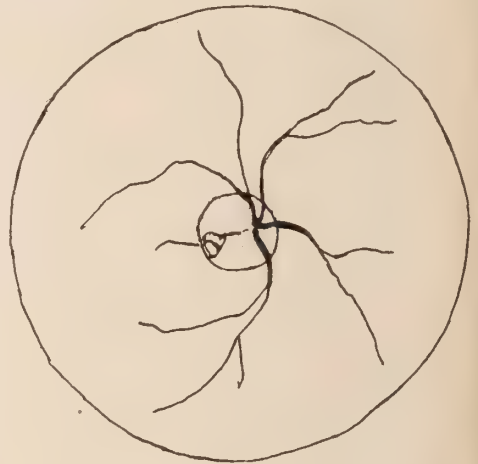


FIG. 1.

Harwood's case of hole in disc. Diagram showing vessel at bottom of hole near temporal margin of disc.

eye showed a triangular hole on the temporal side of the disc just below the center. The edges of the hole overhung the floor as shown by two minute blood vessels which disappeared at its edge. A -8 D. lens showed another blood vessel at the bottom of the hole crossing it diagonally.

## REPORT OF A CASE OF BILATERAL LUXATION OF THE LENS.

FRANK ALLPORT, M. D., AND JAS.

SMITH, M. D.

CHICAGO.

Cases of this sort are always of great interest on account of the infrequency of their occurrence, hence we shall report this case as somewhat of an ophthalmologic curiosity.

According to Fuchs, changes in the position of the lens always have their anatomic cause in changes of the zonula of Zinn—either elongation, rupture or destruction of the zonula, with a subsequent displacement of the lens.

The patient, age 5, had enlarged eyeballs. The eyes suggested the buph-

thalmic type, altho the tension was not raised. There was no tremor of the iris. A mydriatic was instilled in order to make a fundus examination, and also estimate any error of refraction by means of retinoscopy. When the pupils were dilated, both lenses, entirely loose and unattached, and which were clear, floated gracefully into the anterior chamber, and upon the child changing the position of its head, they would float to various locations in accordance with the position of the head, even back into the lens fossa. Luxation of the lens was not suspected at the preliminary examination, and indeed was not evident until mydriasis was induced. The child was entirely unmanageable—had this not been the case, the luxation of the lens might have been manifested.

## SOCIETY PROCEEDINGS

### ROYAL SOCIETY OF MEDICINE. SECTION ON OPHTHALMOLOGY.

June 12th.

President, MR. WILLIAM LANG, F. R. C. S.

Before entering upon the agenda, the President referred in sympathetic terms to the recent decease of Mr. John Couper, an old colleague of his at the great City Ophthalmic Hospital in City Road, always known as "Moorfields." The chief claim of Mr. Couper to fame would be his special ophthalmoscope. Couper's direct method of ophthalmoscopy made possible the minute observations associated with the late Marcus Gunn, a work since perpetuated by Mr. Bardsley.

#### Cyst in Front of Disc.

Dr. G. H. Goldsmith exhibited a case of cystic swelling of the disc. On the left side was a large coloboma of the iris and of the choroid. The disc had suffered almost complete eclipse, by a large swelling which he took to be cystic. It was semitranslucent and

spheroidal, and over the swelling ran two vessels.

#### Mooren's Ulcer of Cornea.

Mr. F. A. C. Tyrrell showed a patient with Mooren's ulcer. It showed very extensive denudation. The patient attended St. Mary's Hospital about a year ago, with a large denuded area, and but a small area of epithelium in the center of the cornea, about 4 mm. across. Two attempts at cauterizing did not bring about healing. He therefore tried the conjunctival flap method, using purse-string sutures. The conjunctiva adhered to the denuded area in the outer part, and the cornea vascularized, but the case did not progress very satisfactorily. After keeping the patient under observation in the hospital a month, he decided to unite the lids in the center, so as to be able to flush the conjunctival cavity thru from side to side. The cornea was now clearing up, and the patient could see fingers at about a meter distance; also the pupil and iris could be seen. He showed it as a sort of sequel

to the similar case he exhibited about a year ago.

**DISCUSSION.**—The President said he touched the cornea in a case of ulcer with pure flavin. The patient said it was very painful, but healing occurred. Many cases did well with weak solutions: this was the only case in which he used the material pure.

Mr. Leslie Paton said he had been watching this case shown by Mr. Tyrrell, and when she came for treatment the area of cornea which seemed intact was steadily becoming smaller: moreover, the area left was insensitive. It was the experience gained in connection with neuropathic keratitis which led to the sewing of the lids in this case. Clearing up of the cornea followed this measure equally well in herpes in which there was deep corneal ulceration. But in the keratitis following removal of the Gasserian ganglion the case seemed different because an attempt subsequently to unsew the lids led to a relapse: that had been his experience. There must be left at least a bridge of tissue of not less than one millimeter.

Mr. J. B. Lawford said his experience differed from Mr. Paton's in this regard. Tho he had sewn the lids in a number of cases of operation on the Gasserian ganglion done by a colleague, in none of them was separation of adhesions later followed by relapse.

#### **Choroidal Scar.**

Mr. M. L. HEPBURN showed a drawing of a case with an old choroidal scar with a fibrous band stretching from it to the disc. The patient came for glasses in the ordinary way, and was not aware of any defect. Vision was 6/9. Such a condition was common after accident or inflammation; but here there was no history of either. Possibly it was a congenital condition.

#### **Cyst of Iris After Injury.**

Mr. A. ROXBURGH showed an implantation cyst. The patient, a girl, aet. 14 years, had her eye struck by a tin toy aeroplane. The mother stated that the eye was operated upon immediately afterwards, probably the prolapsed iris was removed. A fortnight ago the girl complained of some pain,

pricking, and headache. The mother then noticed a dark spot in front of the eye. Vision had fallen from 6/6 to 6/12: tension was but little raised. In the left cornea was some iris adherent to the back of the cornea. Beneath the cornea was a translucent cyst, about  $4\frac{1}{2}$  mm. wide, which appeared to be embedded in the iris, looking in every respect like an implantation cyst. It was increasing in size. He felt it his duty to tackle it, but he had never operated upon an implantation cyst of the iris.

**DISCUSSION.**—Mr. Treacher Collins agreed with the diagnosis, and said it was very important that the cyst should be removed. Otherwise it would certainly fill the anterior chamber, and cause increased intraocular tension. In removing it, it was essential to include the portion of iris which formed the back of the growth. If that bit of iris were left, the growth was practically sure to extend.

The President agreed with Mr. Collins, adding that the extent of these cysts often proved to be greater than it appeared to be.

#### **Luminous Test Type.**

MR. M. S. MAYOU showed, for CAPT. MOXON, test types of a luminous character, on the principle of the luminous wristwatch, for estimating the degree of light sense and night blindness. After getting accustomed to the darkness, a normal person could read these types in a completely darkened room at a distance of 4 feet. Mr. Mayou had ascertained that the paint used was composed of radium bromid and zinc sulphid, the light being due to the radium rays bombarding the zinc sulphid. It could scarcely be regarded as a standard, however, seeing that the luminosity decreased with the age of the composition, and bore a relation to the thickness of the lettering. The scientific standard would be a screen illuminated from behind, the observer wearing green glasses.

#### **Neuroretinitis with Chickenpox.**

MR. LESLIE PATON showed a patient in whom chickenpox was associated



with neuroretinitis. There was only one other case of the kind on record, tho neuroretinitis had been recorded in connection with polioencephalitis. The present patient had had nothing else amiss with him, and his blindness came on suddenly on the third day of the chickenpox. The large central scotoma was now gradually clearing up.

#### **Bifocal for Myopes.**

MR. P. C. BARDSLEY read a communication on a new form of bifocal for myopes. He said there had arisen a school of ophthalmologists who taught that in early life myopia should be fully corrected, the subject continuously wearing glasses to fully correct, however high the degree of defect might be. This school argued that high correction only turned the child or young adult with myopia into a person with normal vision, and that thereby the accommodation was called into play, as was the accommodation of the emmetrope or the hypermetrope. The same people stated that if this full correction was not given, certain dire results would ensue: accommodative power would be lost, and rapidly progressive myopia would take place. But no evidence had been adduced that lack of full correction of myopia resulted in an increase of myopia.

The author had himself been myopic since early childhood, and it had but little increased since. He had objected to prolonged study in glasses which gave full correction, and when well over 40 years of age his accommodation was found to be more powerful than any recorded up to date at the Oxford Ophthalmological Congress. Why, he asked, should myopes be robbed of the privilege of reading without using their ciliary muscles?

On looking down thru the lower glass in the ordinary bifocals, there was a considerable distortion of the image. To overcome this, the author angled his bifocals. They were made of separate pieces of glass slightly bevelled against one another where the pieces met. Next, he angled the circular bifocals, and to overcome the defect of bringing the edges of the upper

and lower glass into continuous contact, he ground a toric curve on the upper lens, and a double concave or convex on the lower lens. He detailed the advantages resulting from this improved kind of spectacles.

#### **Hysteric Disorders of Vision.**

MR. L. R. YEALLAND read a paper on hysteric disorders of vision.

The paper was based upon Dr. Yealand's experiences as resident medical officer at the National Hospital for the Paralysed, Queen Square. He said hysteric disorders of vision could be grouped, clinically, into two classes: (1) conditions in which contraction of antagonists could be demonstrated, (2) those in which this could not be demonstrated. By contraction of an antagonistic group of muscles he meant the contraction of a group which should be relaxed during the performance of a given movement. This could be demonstrated in blepharospasm, ptosis, and spasm of accommodation. In blepharospasm there was simultaneous contraction of the levator palpebrae superioris and of the orbicularis oculi. Failure of relaxation of the last-named muscle prevented the opening of the eye, hence there was apparent loss of vision.

The action of the antagonists in spasm of accommodation could be explained on the assumption that the suspensory ligament of the lens performed an opposite action to that performed by the ciliary muscle. When the latter contracted, the ligament relaxed; when the ligament was in a state of tension, the ciliary muscle relaxed. The phenomenon of contraction of antagonists could not be demonstrated in such conditions as limitation of the visual fields and amblyopia, but in these conditions, contraction of antagonists in some other part of the body could be observed. The treatment was one of suggestion, and must be got thru at one sitting. It produced complete relief of the physical disability, tho much could not be hoped for in improvement of the mental state.

H. DICKINSON.

## CHICAGO OPHTHALMOLOGICAL SOCIETY.

April 15th, 1918.

President, DR. HEMAN H. BROWN.

### Convergent Strabismus Treated by Atropin and Glasses, with Some Cases of Hereditary Strabismus.

DR. CLARENCE LOEB read a paper on this subject which will be published in full in this JOURNAL.

### The Surgical Treatment of Strabismus.

DR. H. W. WOODRUFF stated that the surgical treatment of strabismus must be considered when other methods of treatment have failed. In most instances the object to be obtained is cosmetic rather than an improvement in function; altho the latter is occasionally obtained when the visual lines have been approximated by a successful operation.

The author has been doing the tucking operation for many years, in preference to advancement; usually combined with partial or complete tenotomy of the opposing muscle. This operation has been done without the use of the tendon tucker. Briggs, he said, has apparently simplified the tucking operation by his method of clamping a wire loop over the folded tendon, capsule and conjunctiva. It occurred to the speaker that if this operation would exclude the conjunctiva, and catgut sutures were used in place of wire, it would be ideal. He has not as yet completely satisfied himself that the older tucking operation which he has been using for many years should be given up. However, the simplicity of the new one recommends it.

After describing the tucking operation, the essayist drew the following conclusions: 1. Operate at any age when local anesthesia is permissible, and nonsurgical measures a failure. 2. Never do an advancement, but always a tucking in any degree of actual concomitant strabismus. 3. Tenotomize the opposing muscle, when necessary, to increase the effect of the tucking. 4. In convergent strabismus, never secure an over effect when tenotomy is

used. If such a result is accidentally obtained, correct at once by a suture. 5. When complete tenotomy is performed, guard against the sinking of the caruncle by using a conjunctival suture. 6. In paralytic strabismus the operation of tendon transplantation should be used.

DISCUSSION.—Dr. Robert von der Heydt stated that there are more eyes lost to usefulness from neglected squint than by all other causes. All squinters have a hereditary taint in the form of a muscle imbalance. This, together with reduced visual acuity in the one eye, from any cause, or high hypermetropia will bring on a squint. Alternating strabismus is so marked a muscle imbalance that it overcomes the fusion tendency; or the angle may be such that the object looked at falls on the blind spot of the squinting eye, hence monocular suppression is more easily acquired. Refraction under a cycloplegic is the first step in the treatment of squint. In case of failure to create parallelism by glasses, atropin in the fixing eye may be used. If we can by its use transfer the work to the squinting eye, we may educate this eye to fixation, later fusion and permanent parallelism. If not, occlusion must be resorted to. A method of handling this variety of squint he presented at the meeting of the Society last October.

Dr. D. T. Vail, of Cincinnati, Ohio, stated that the teachings of Valk conformed so closely to his own ideas and observations that he feels there has been no real contribution to the etiology of strabismus since Valk's publication some ten years ago. He believes that Valk stated that so-called amblyopia ex anopsia is one thing and congenital amblyopia is another. We may have congenital amblyopia with no strabismus. He has seen many cases where the affected eye was perfectly straight and had only 20/200 vision and could not be improved with any amount of atropin, training or glasses. The same is true where the congenital amblyopia is associated with strabismus.

Nothing improves the vision in true congenital amblyopia. Amblyopia ex

anopsia associated with convergence is entirely different. Here we have an amblyopia because the child has an ex anopsic eye which is possessed of a high degree of ametropia, and the visual image in it is suppressed. Usually there is compound hypermetropia, and the convergence is caused by the excessive action of the internal rectus association with accommodation effort. In such cases one may almost invariably accomplish a good deal by glasses, atropin and training.

There are many different types of convergent strabismus, and each case must be studied on its own merits and a differential diagnosis made. He has seen quite a few cases with double paralysis of the sixth nerve in which there was inveterate double convergence. In these cases the refraction and vision in each eye may be normal, and yet the convergence is extreme, with no power in either eye to bring the axis of vision beyond the median line. Such patients will use the right eye for seeing objects in the left field, and the left eye for objects in the right field. In spite of everything one may do, these patients will continue to "cross fire."

Referring again to the subject of congenital amblyopia, the speaker called attention to the excellent book of Collins and Mayou on "Pathology and Bacteriology of the Eye," stating that this book contains an explanation of what congenital amblyopia is, why it is, and why no amount of treatment or operation succeeds in improving it. Collins, he says, teaches that there is a lack of differentiation of the macula lutea in congenital amblyopia. By this he means that the macula lutea is not particularly different from other parts of the retina. There is no macula lutea. If one will examine the region of the macula in a case of congenital amblyopia ophthalmoscopically, and compare its appearance with that of the seeing eye, he can satisfy himself that this teaching of Collins is correct.

When about to undertake an operation for concomitant squint on little folks four or five years of age, the speaker sometimes has been surprised to note that the condition has entirely

disappeared under the anesthetic. He has seen cases in which the eye that was convergent became markedly divergent under the anesthetic. During sleep such eyes must be divergent and during waking hours convergent. He has tenotomized cautiously such cases with success, and in some of them has noted in after years a well developed divergence. On the other hand, he has seen such cases that after ten or more years have perfectly straight eyes with normal fusion power.

Another class at close range can fuse very nicely and hold the focus, but the moment the accommodation relaxes, as when looking at infinity, the poorer eye becomes divergent. He thinks it is best to use the plan of atropin and glasses when there is a strabismus of less than  $15^{\circ}$ . When it is more than  $15^{\circ}$ , he recommends tenotomy. A simple complete tenotomy would insure  $15^{\circ}$  of correction, but not more than that.

As regards tucking, he thinks it is only a temporary affair. The temporary help which it gives is very great, and it really amounts to a permanent cure in many cases. But the tuck unfolds in 10 days or a few weeks and is no longer a tuck. In order to accomplish any good with a tuck one must cut or weaken the opposing muscle. The speaker has accomplished just as good results by putting in a reef stitch as by the tucking procedure, but a reef stitch will not hold as long as a tuck; it pulls out sooner. The reef stitch is used for divergent strabismus where one cannot get too much effect and is not worrying about convergence following. He puts a strong stitch in the sclero-corneal tissue and carries the needle deeply thru the substance of the caruncle, and then by tying the margin of the cornea flush with the caruncle, he can, in divergent strabismus, produce a marked temporary over correction which compels the severed tendon of the external rectus to retract, thus gaining the desired permanent result with no fear of permanent convergence. The stitch is removed on the third, fourth or fifth day.



Dr. Oscar Dodd thinks that the question of the treatment of strabismus can neither be considered purely operative nor as one in which atropin and glasses alone are used. Every case of strabismus, unless of adults who have had strabismus for years and where operation is indicated simply for cosmetic reasons, should be gone into very thoroughly and studied under atropin and correction with glasses, to see how much effect can be gained. Most of the children with strabismus who come to him are amblyopic to quite a large degree in the converging eye.

If one eye is practically normal and the other one has less than 20/40 vision, the use of atropin and the correction of the hypermetropia and astigmatism with glasses will not effect a cure. In most of those cases one has only begun treatment. When the patients are young, six, eight or under ten years, he finds that it is necessary to keep the good eye covered constantly, sometimes for several weeks to correct the amblyopia. When that is done, he has seen the vision improve, from 20/100 to 20/40 in a few weeks. Using the amblyopic eye alone for one or two hours daily is absolutely ineffective. Educational treatment and development of the fusion sense with the amblyoscope is of value, but it is difficult to use with children.

If the amount of strabismus is 10°, 15° or 20° after securing all the benefit possible from the use of glasses, he believes operation should be done. He is not successful in operating on children under local anesthesia, as it is very rarely that they will submit to the operation which he deems necessary. He would not do a tenotomy on a child, expecting it to be permanent, because he has had patients return after 10, 15 or 20 years with divergence, when the result of the operation seemed absolutely perfect at first. Nothing should be done in these cases but tucking and advancement. In the tucking operation he puts his stitches thru the insertion of the tendon so as to get a good fixation point, using catgut which absorbs in from 10 to 20 days. Doing a

tucking operation with the instrument Dr. Woodruff has demonstrated is certainly a very easy and quick method.

Dr. Colburn stated that he devised a muscle tucking operation at about the time when the American Medical Association met in Columbus, 1899, and made a preliminary report on it. An instrument maker made for him a muscle tucker at that time. He did not follow up the use of the tucking operation because he found that he had a rather annoying puckering, so that after two or three years of use he abandoned it almost entirely, excepting as an aid to general tenotomy, tucking on the opposite side. The various means of operating, whether to tuck or advance, are debatable. One should take into consideration not only the condition of the refraction, but the anatomical condition of the eyes and head.

Dr. William A. Mann stated that when a patient first comes in for examination, if the convergent eye will not fix and stay fixed, he has very little hope of doing anything with atropin, if the vision shown is 20/200 or less. In these cases, if one will cover the good eye, the other eye will wander. On examination one finds not only an absence of the macula lutea but an increased number of blood vessels in the macular region. One may find the blood vessels almost running thru where the macula should be. In those cases of congenital amblyopia glasses are practically no good. He does not recall a single case where he has succeeded in developing central vision.

Dr. von der Heydt, in connection with the discussion of tucking methods, exhibited a little silver clamp he has designed for advancing a muscle. The muscle to be shortened is drawn thru the clamp and held by two screws. It is then left in the eye until the strangulated muscle sloughs off. He has used it in three cases thus far with success. It took eleven, twelve and fourteen days respectively. Some of the clamps were passed around for inspection.

Dr. Clarence Loeb, in closing on his part, stated that he did not agree with

Dr. von der Heydt in regard to the success in alternating strabismus. Those cases, as a rule, have been most successful under the treatment described. As to Dr. Vail's statement about paralytic squint, one could not expect any improvement from the use of glasses, but he could not expect it, on the other hand, from the operative side. The report was rather an attack upon the theory that all cases should be operated, rather than to insist that all cases would be cured by the use of glasses and treatment.

As to the question of differentiating between amblyopia ex anopsia and congenital amblyopia, the speaker does not think it is quite as simple as indicated. He has examined quite a number of young children with convergent strabismus, and although one eye had less vision than the other, he could not recall that there was any difference in the macula. The question of strabismus and amblyopia ex anopsia is not that the strabismus results from the amblyopia, but that the strabismus causes it. If this were not so, he could not explain the experiences of the last couple of months in connection with advisory boards, where they have had quite a number of patients whose vision in one eye was decidedly below the other, and at the same time there was no strabismus. If amblyopia causes strabismus there should be a much higher degree of strabismus than found.

Dr. Woodruff, in closing, said that in paralytic strabismus the operation of tendon transplantation should be used. The speaker has seen and has operated on two cases of paralysis of the external rectus muscle. The etiology in one case was possibly traumatic, a head injury; at least, that was the only history obtainable, while the other was probably a congenital case. It was his first experience with muscle transplantation, and the result was much more satisfactory than with any other operation which he had ever attempted. In a paralysis of the external rectus, parallelism can be maintained looking straight ahead, but with very little ability to rotate the eye out-

ward. That was his experience in these cases, but one of these cases gave an exceedingly gratifying result. This case was described in detail.

### Unilateral Papilledema, Case for Diagnosis.

DR. HUGHES, of Elgin, reported the following case:

Mrs. J. R., aged 22. Referred by Dr. R. on March 25, 1918, who asked for a fundus examination. Patient's mother died seven years ago at the age of 39, from uremic poisoning subsequent to the removal of the kidney for tumor. Mother was subject to severe vomiting spells and headache which lasted several days at a time.

Personal history: Patient has had most of the diseases of infancy. Typhoid fever at 10 years. Was poisoned from milk when several weeks old and has been sickly since. In 1913 she was ill for several months with what a physician called the early stage of tuberculosis in the left lung. She spent several months in the country and apparently recovered. She had scarlet fever in 1915.

Present history: Has been subject to headaches for several years. Last July she had a very severe headache accompanied by nausea and vomiting, dizziness, and a tendency to fall to the right side. There was very severe noise in the head and right ear at that time. At first, the headache came at intervals of one month, at the time of menstruation, but later became semi-monthly, and at present weekly or more often. Patient states that after the attack she feels like a man "after a jag." There is a tendency to fall to the right for several days, and lying on the right side causes a feeling of dizziness and falling to the right. Headaches are frontal and fronto-occipital. Of late the menstrual flow is getting less. She is deaf in the right ear, is losing weight constantly. She has been married for six months, but no pregnancy. No loss of vision in an attack, but there is marked increase in the head noise.

Patient looks worn and rather anemic. Nose shows a septal deflection to

the left side with congestion of the inferior turbinate. Sinuses negative. Throat negative. Right ear drum retracted but mobile; reflex still present; no congestion. Left ear negative. Hearing: Galton all the way, both ears. Voice, right ear loud voice at 14 feet, whisper at 8 feet. Left ear normal. Turning to the right produces dizziness with a tendency to fall to the right. No nystagmus. To left normal. Tubes normal in both ears. Inflation does not improve hearing.

The appearance of the eyes is normal. Tension normal. Reaction normal to light and accommodation. Vision of 20/20 in each eye. Fundi: right eye normal; left eye choked disc of about two diopters. Fields: right eye normal; left eye contraction of form field to 35 above, 30 nasal, 60 temporal, 30 below. Concentric contraction of color fields. No active specific infection, but reaction sufficient to say an inherited type of infection. Blood pressure: Systolic, 130, and diastolic, 100.

Dr. Hughes stated that his object in reporting this case was to get some information as to the nature of the lesion and where it is located.

DISCUSSION.—Dr. Robert H. Good stated that the case appeared to be one of intracranial pressure. There was some edema of the right optic disc as well as the left. In addition there is involvement of the right ear. The patient became sick suddenly in July with severe headache, nausea and vomiting. This nausea still continues every time she has a recurrence of the headache. According to the patient, there is a peculiar numbness in the right arm and right leg. The speaker recommends lumbar puncture with a view to determining the pressure of the spinal fluid. If the pressure is shown to be increased, one knows then that there is an increased intracranial pressure.

The picture resembles to some extent that of cystic involvement of the temporal lobe of the right side of the brain. On pressing the head very hard the right temporal region is very tender. The patient complains very much from this pressure, so that the lesion is

undoubtedly located in the right temporal lobe of the brain. Wherever one finds marked tenderness in a certain area, it is usually a fairly good indication of the location of the trouble. He is absolutely of the opinion that if the lumbar puncture shows an increased intracranial pressure, this patient should have a decompression. That it is not a tumor, one may assume, from the fact that the attacks occur at intervals; and between intervals there is no headache and no pain. If there were a tumor present, one would expect the sight to be impaired by this time. It is probably a cystic condition of the right temporal lobe of the brain.

Dr. D. T. Vail, of Cincinnati, said the case of Dr. Hughes is one of interest on account of its obscurity. The history of headache and vomiting, associated with other symptoms, seems to clearly indicate excessive intracranial pressure. The case calls for a careful differential diagnosis, but the onset is so recent and the symptoms so indefinite, that about all one can now say certainly is that there is increased cerebral pressure, and that is a condition common to several distinct and widely differing brain maladies. The speaker is impressed with the thought that the present stage is transitory, and that later on characteristic symptoms will establish themselves so that a definite diagnosis will then be possible.

In differentiating one should first endeavor to learn whether the lesion is anterior or posterior, whether at the cortex or base, also whether above or below the tentorium. The study of the pupils affords the most valuable evidence. Unfortunately the pupils are now dilated with a mydriatic for aiding ophthalmoscopic examination, but Dr. Hughes reports they were entirely normal. Normal pupils in a brain case excludes internal hydrocephalus or distention of the third ventricle. This is very important, and enables one to say at once that the region of the third ventricle is not directly involved. Hydrops of this ventricle would affect the pupils; and also the third nerve, for the pupillo-motor fibers as well as the fibers of the third nerve have their cen-



ters along the floor and sides of this ventricle.

The next question is, could these symptoms arise from hypophyseal disease? One sees so many variations from the classical symptoms of hypophyseal disease that the typical acromegaly is the rare exception. The study of this case is not complete until a transverse radiogram is taken to demonstrate the size and depth of the sella turcica, and if the clinoid processes are eroded or displaced.

Then comes the question of a tumor of the right auditory nerve. Neuroma affecting the eighth nerve would produce all of the symptoms one finds in this patient. The auditory nerve trunk is short and composed of two kinds of nerve fibers. Where these nerve fibers merge is the favorite site for the development of a neuroma. The location is usually just where the auditory nerve enters the internal auditory meatus. He ventures to predict that after Cushing reports his series of cases, their operations and ours, one will be looking for them and he will find them. The symptoms are Meniere's complex, profound tinnitus; total deafness and ocular symptoms such as choked disc, nystagmus, etc.

Cushing has diagnosed and operated on 8 cases during the year preceding the entry of America into the present war with Germany. The operation is simple. An incision is made, the scalp stripped from the temporal bone, the bone flap raised and just inside the skull lies the fusiform tumor of the auditory nerve. The dura is not opened. An incision is made in the dural sheath of the nerve and the tumor mass is curetted away. The growth is semi-benign. The amazing thing is that the hearing is restored in about 50 per cent of Cushing's cases.

The ordinary functional hearing tests are of no value. Bárány's tests must be made. The present case should be examined in this way to determine whether this disease is present. It enters into the differential diagnosis and must be excluded. The optic neu-

ritis and increased cerebral pressure are present because the tumor lies below the tentorium. Weeks' statistics published in his text book show that 100 per cent of tumors of the cerebellum have papilledema. In almost 15 per cent of the cases the choked disc is on the side opposite to the tumor.

Next comes the question of tumor of the cerebello-pontine angle. An oncoming tumor in this location would present all the symptoms this case exhibits. Later on the hemeplegia and also the strabismus due to paralysis of the sixth nerve, as well as the palsy of the intraocular muscles from internal hydrocephalus affecting the third nerve centers, will show themselves, and then the diagnosis of cerebello-pontine angle tumor will be easy. Deafness, optic neuritis, sixth nerve palsy, third nerve palsy, hemiplegia, vomiting, headaches, etc., are characteristic symptoms of tumor in this location. The optic neuritis on the opposite side is not inharmonious with tumor of the angle in the presence of subtentorial increased pressure.

Dr. Vail said that other conditions causing monocular optic neuritis, such as tumor or abscess of the sphenoid or posterior ethmoid cavities are to be thought of and searched for, altho he hardly expects confirmatory evidence will be found favoring this group of diseases, for the other symptoms, deafness, dizziness, vertigo, vomiting and headache are not common to disease of the sphenoid and ethmoid cavities.

Dr. Alfred N. Murray said that he reported a case about 8 or 9 years ago which had symptoms somewhat similar to those in Dr. Hughes' case. The left ear was totally deaf. There was choking of the right disc. Dr. Halstead operated and found a cyst at the left cerebello-pontine angle about the size of a hen's egg. Vision almost immediately began to clear up. Vision in the left eye returned to normal, and in the right eye, where the choking was, did not return completely to normal, but remained about 20/30. There were no

typical symptoms of labyrinth disease. Total deafness in the left ear was evidently due to pressure on the auditory nerve. He saw the patient about two months ago, and his vision is just as it was when he left the hospital eight years ago. He is working at his trade the same as ever, and apparently suffers no inconvenience of any kind.

Dr. Smith said that in making a diagnosis of auditory tumor one should consider all the symptoms. There are some symptoms that are indicative of a central lesion and the patient has a tendency to fall in one direction. In locating lesions here in the temporal lobe one should bear in mind that the labyrinth apparatus and nerve fibers take a different course from those of seeing. He thinks the symptoms point directly to a right sided lesion. The beginning choked disc is absolutely indicative of some pressure. A tumor of the cerebello-pontine angle, either on the eighth nerve or in close approximation would give all these symptoms, including disturbances on the right side. There is no very marked ataxia. There is a little difficulty in coordination, but not much.

In operating he would not simply do decompression, he would go farther as one might find something that could be removed. He fails to see any difference between a cyst and a tumor. He has never been able to see any difference in making a diagnosis, from the symptoms. A spinal puncture is indicated and should be done gradually, care being taken not to let all the fluid escape at once. A cell count and Wassermann of the spinal fluid should be made. A positive colloid test would indicate syphilis. One might combine with decompression massive doses of potassium iodid, mercury or arsenic. Operation should not be delayed too long. Subtemporal decompression is the operation of choice, if one is sure there is nothing more to be found there, but the speaker would advise a cerebral decompression.

## SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

March 21, 1918.

DR. S. LEWIS ZIEGLER, Acting Chairman.

### Tumor of the Orbit.

DR. WILLIAM CAMPBELL POSEY exhibited a man, aged thirty-five years, from whom he had removed a large fibroma of the orbit four weeks previously. The growth, which resembled in size and form a large myopic eye, was situated back of the eye, superior to the optic nerve, tho not in connection with it, and had proptosed the eye 12 mm. in advance of its fellow. The displacement of the eyeball was first noticed by the patient six years previously and had been slowly progressive. Vision was but little affected, tho the movements of the globe were considerably impeded. The tumor was removed thru an incision made at the outer angle of the orbit, with the intention of performing a Krönlein, if such procedure were found necessary. The delivery of the mass was effected, however, without resection of the bony wall of the orbit. Recovery had been prompt, tho there is still some exophthalmos and restriction in motion of the eyeball. Dr. Posey thought that time would gradually in large measure overcome both of these conditions.

### Optic Nerve Lesions Following German Measles.

DR. POSEY read the notes of 2 cases where inflammation of the optic nerve supervened immediately after an attack of German measles. In the first case, a man aged thirty-two years, the axial fibers of the right optic nerve were alone affected, as evidenced by a slight diminution in vision, a lowering of the light sense, and the presence of a central relative scotoma. The temporal half of the optic nerve of the affected eye was grayer than normal. The left eye was unaffected. Altho there was a family history of glaucoma, there were no symptoms of this disease. Examinations of the accessory

sinuses of the nose were negative. An X-ray examination revealing an abscess of one of the teeth in the left upper jaw, the removal of the tooth was advised, but this procedure seemed to have no influence upon the neuritis.

In the second case, that of a boy, aged sixteen years, the toxins had produced an inflammation of much greater intensity, the entire head of the left optic nerve exhibiting marked papillitis, with marked involvement of the retinal vessels, the veins especially being swollen and tortuous, giving rise to the suspicion of thrombosis. As has been observed by others in similar cases, vision was but little affected,  $V. = 5/7\frac{1}{2}$ . The visual field was normal, save for a relative central scotoma, probably accounted for by a few fine hemorrhages in the macular region.

Dr. Griscom spoke of a case of intense double optic neuritis following measles which he had reported in 1911. The patient made a complete recovery both as to vision and fields, altho the nerve heads remained very pale. He reviewed the literature on the subject up to the time of the report and found only 23 cases of blindness due to optic nerve lesions following measles, all but three of which came under the head of optic neuritis. These cases could be divided into three classes: (1) Those showing evidences of primary cerebral involvement with secondary optic nerve change; (2) those showing meningitis as the most prominent symptom with consequent optic neuritis, and (3) those showing optic neuritis without any other local or general symptoms.

#### **Associated Action Between a Paretic External Rectus of the Left Eye and the Masseter Muscle.**

DR. POSEY exhibited for his colleague, DR. SCHWENK, a man, aged thirty-four years, who showed a curious contraction of the paretic external rectus muscle of the left eye, when the masseters were thrown into activity by the act of biting. (See full report, p. 393.)

#### **Occlusion of Central Artery of Retina.**

DR. F. KRAUSS presented a case of occlusion of the central artery of the retina of the right eye in a fifty-eight-year-old man. A small section of the retinal artery was discernible on the disc, otherwise there was no evidence of its existence. The veins were full and tortuous, with innumerable hemorrhages thruout the field. The vision six weeks after the onset was  $3/60$ , which is remarkable considering the fundus change.

#### **Angioid Streaks in the Retina.**

DR. CHARLES R. HEED exhibited C. J., male negro, aged twenty-eight years.

Ophthalmoscopic examination: R. E., media clear, optic disc and retinal vessels normal. The temporal half of fundus, extending from the disc margins in a radial direction for a distance of four diameters, presents retinochoroidal changes of an unusual type. The color is grayish, presents a few pigmented areas and numerous hemorrhages lying in the deeper retinal layers. Many deeply pigmented branching streaks running beneath the retinal vessels are noted. These streaks appear to come into direct contact with many of the hemorrhages and converge to the pigment area about the disc. There are a few hemorrhages seen in the nasal field with several of the streaks converging to the disc margin. The general nasal and entire peripheral portions of the fundus appear normal. A dense capsular opacity obscures the fundus of the left eye.

#### **Apparent Accommodation in Aphakia.**

DR. WILLIAM ZENTMAYER reported a case in a girl, aged eight years, with acquired cataract. This report is published in full, p. 570.

DISCUSSION.—Dr. Ziegler said that the cases he had observed of this condition were due either to the action of the extraocular muscles on the globe or to nipping of the lids, and also that such cases were those with a correction of  $+13$  D or more, with a very small amount of astigmatism.

J. MILTON GRISCOM, M. D.,  
Clerk.



## COLORADO OPHTHALMOLOGICAL SOCIETY.

April 20th, 1918.

Dr. D. H. COOVER, Presiding.

### Retinal Angiosclerosis.

Dr. D. A. Strickler presented Mrs. L. D. W., age 57, housewife. First seen March 30, 1918, with the following history: Two or three months ago she suddenly noticed dimness of vision in R., but no pain in the eye or head; thinks she sees a little better than when first affected, but no appreciable change recently.

Family history: She has two brothers and three sisters ranging in age from 53 to 63, all living. Mother died of Bright's disease at 59. Father died at 74 of paralysis. Had had three or four attacks in the two years before death.

Examination: V = L. 20/100, corrected to 20/20. R. central vision lost with indefinite vision peripherally. Right fundus showed small retinal hemorrhages between disc and macula, also on the upper portion of the disc, with a few white lines especially toward the macula. No definite lesion was noted in macular region. There was undue tortuosity, alteration in size, breadth and course of retinal arteries; loss of transparency, as shown by veins, lost to view under the crossing of artery; and, impeded venous circulation at the distal end. In the left fundus there were small, hemorrhagic spots above disc about 1 and  $\frac{1}{2}$  diameters, with other conditions much the same as in R.

Diagnosis: Retinal angiosclerosis with retinal hemorrhages. Blood pressure 185-220. A trace of albumin. with casts. Hypertrophied heart.

Examined next on April 18th when she reported that on April 3rd, R. E. became red, painful and sensitive to light and had so remained. Tension definitely increased; the fundus could not be seen because of cloudy media. Diagnosis: Hemorrhage into vitreous.

Discussion.—Dr. J. A. Patterson said he had had a similar case only he believed his patient's eyes were worse.

This patient, a man, had suffered from smallpox. While in quarantine his eye gave him trouble and he used some atropin, which was given him by another patient, also in quarantine. The atropin was used for one week. After he was out of quarantine, Dr. Patterson found the T. 68 mm. of mercury. Eserin was immediately used. The eye and vision were better for a time, but later were worse again. Under hyoscin and dionin the eye was made to improve a second time. On account of the hyphema, he believed an operation was not indicated. There were posterior synechiae, and the fundus could not be examined on account of the cloudy media, hemorrhage, etc.

Dr. E. M. Marbourg spoke of Dr. Patterson's case, as he had the pleasure of seeing it, too. At the time he made his examination, the tension was 64 mm. and the pupil was 4 mm. in diameter. The patient had lost weight. Under dionin and eserin, the tension was reduced to 45 mm. but the pain recurred. At no time was he able to obtain a view of the fundus.

Dr. Melville Black said the hemorrhage of the optic nerve or pressure on the central fibers from the sclerotic central artery may have produced the loss of central vision in Dr. Strickler's case.

### Serpent Ulcer of Cornea Due to Pneumococci.

Dr. Wm. C. Bane presented A. J. G., age 33, woodworker. On April 13th, he got a bit of sawdust in O. S. When first examined April 15th a small ulcer existed. This was curetted; antiseptic ointment applied; and the eye sealed. The next day the ulcer was 2 mm. in diameter, and the eye had been very painful during the night. Prince's pasteurization method was used and atropin instilled. Aspirin and calomel were given. April 17th the ulcer was 3 mm. in diameter; there was a crescent of exudate in the anterior chamber and marked congestion of the eyeball. So the pasteurization was repeated. At 4 P. M. the ulcer was larger and the discharge revealed

pneumococci. Under cocain, ethylhydrocuprein hydrochlorid powder was applied direct to the ulcer. Marked reaction followed, the epithelium around the ulcer becoming detached. April 18th, had a comfortable night with no increase of exudate in the anterior chamber. Ulcer 4 mm. in diameter and a ring  $1\frac{1}{2}$  mm., devoid of epithelium, around the ulcer. Atropin and iodoform were used. April 19th less exudate in the anterior chamber and less congestion of the ball. Epithelium about reformed around the ulcer. April 20th ulcer nearly 3 mm. in diameter and no exudate in the anterior chamber. One per cent ethylhydrocuprein hydrochlorid instilled. Atropin and iodoform used. Eyeball not painful.

DISCUSSION.—Dr. E. R. Neeper said there were two interesting features in this case. First, he had not known that optochin could be used in powdered form, as he felt it was too escharotic when so used. Second, cocain had never been very satisfactory in his hands in any case, as it tends to make the infection spread and it makes the cornea quite hazy. He believed it lessened the vitality of the corneal epithelium if not other tissues of the cornea. He preferred to use holocain in such cases.

Dr. Melville Black said optochin was supposed to produce amaurosis in pure form. At least this had been true in the case where large doses were used in the treatment of pneumonia. The overhanging edges of the ulcer were gone in Bane's case, probably due to the fact that he had used the powdered optochin. He believed this feature alone made it worth while to use the powdered form.

Dr. Wm. H. Crisp also emphasized the fact that amaurosis occurred only with systemic poisoning where large doses of the optochin were used in pneumonia. It is a copper salt and hence is apt to produce small vesicles of the cornea. He doubts if the powdered optochin were better than pure nitric acid if carefully used.

Dr. O. Orendorf pointed out the fact that young adults recover from pneumococcus ulcers much quicker than the aged.

Dr. J. A. Patterson said he rarely bandaged an eye. He believed if we seal an eye we prevent drainage and favor a pneumococcus infection. He used Dr. Crisp's method of rubbing in the optochin.

Dr. Wm. C. Bane said he favored the use of melted vaselin poured into the conjunctival sac. He melted this by warming it in a teaspoon, over an alcohol flame, until it was liquefied, and then poured it into the conjunctival sac. He stated that he did not use White's ointment, but simply plain sterile vaselin.

### Partial Cataract Following Injury.

Dr. Edward Jackson presented a man, aged 68, a stone cutter, whose left eye had been struck with a minute piece of stone twenty years ago. He was in central Wyoming at the time and was not seen by any doctor. The eye was "blind for three weeks" and then gradually got better. Before the accident, it had been as good as the right, but since then it had been noticeably worse. Three months prior to the meeting, vision in R. became impaired, so that L. was the better eye. Corrected vision: R. = 0.4; L. = 0.7. The latter required +1.50  $\pm$  -3.00 cyl. ax. 65. O. D., presented retinal vascular disease, dilated veins, numerous small hemorrhages, retina and optic nerve gray and opaque with exudate. Urine normal; blood pressure, 160—110. The keratometer showed +0.50 cyl. ax. 180.

The left eye showed slight narrowing of the arteries and narrowing and obscuration of the veins at crossings. It was free from inflammation, iris and pupil normal, cornea clear except a faint nebula in front of nasal margin of a 5 mm. pupil. In the lens there was a comma shaped opacity. The head deep in the anterior cortex or in the anterior layers of the nucleus, looked white like a calcareous deposit, with a small black speck. The tail of the opacity extending forward, and toward the

center of the pupil was thinner and gray. In the lower nasal periphery of the lens, there were masses of cortical opacities anterior; but these did not extend into the pupil. The remainder of the lens was clear. The right lens was clear. The probable explanation seemed to be a minute foreign body lodged in the anterior nucleus of the lens, followed by some swelling and opacity, clearing up subsequently, and the eye becoming entirely quiet, and remaining so for twenty years.

**DISCUSSION.**—Dr. J. A. Patterson asked if the lens had retained a foreign body. Dr. Jackson thought this was possible if the foreign body had been very small and nonirritative.

Dr. Melville Black said twenty years' duration went to show how long a lens will retain a foreign body without complete cataractous change. He referred to a case of a child struck in the eye with a piece of copper following the explosion of a miner's cap. The iris and lens were both damaged and there was a partial opacity of one lens. In another case the slightest damage may produce a total opacity, so we cannot always judge by the extent of the injury how much obscuration of vision will result.

### Tests for Color Blindness.

Dr. Edward Jackson exhibited a set of colored plates devised by Ishihara of Tokyo, Japan, for testing color vision. Each plate consisted of a background of a confusion color, with a figure in the test color easily recognized by the normal sighted, but unseen by the color blind. In two tests, the colors were so chosen that the figure would be more evident to the color blind than to the normal sighted; and one plate was arranged to be equally visible to normal or color blind.

### Interstitial Keratitis.

Dr. W. F. Matson presented Miss R. O., age 32. Father and mother were living and in good health. Several brothers and sisters were living and have always been well. One child died in infancy with some kind of bowel trouble. Patient had had the best of health, she thought. First attack came

July, 1917, and continued over a period of 10 weeks, then cleared up with 20/20 vision with her correction. This was in the upper segment and some small vessels still remain. The last attack began three weeks ago from the nasal sector and had extended 3/4 across the cornea. The upper sector, which became involved in the last attack, was slowly getting clearer.

The upper third molar was devitalized seven years ago, and this may have a root abscess as the cause of the interstitial keratitis. The tonsils and sinuses were negative. Tuberculin and Wassermann tests had not been made.

**DISCUSSION.**—Dr. J. A. Patterson said the dark color of the tooth was due to the devitalization and not to the amalgam filling.

Dr. G. F. Libby said Dr. R. C. Brownlie believed a dead tooth was a menace to any patient's health and should be removed to avoid a future streptococcus infection.

Dr. Melville Black said this patient had a uveitis due to any one or more of four causes. First, infection in the tonsils; second, gastrointestinal infection; third, tuberculosis; and fourth, root abscesses about the teeth. He believed that all four of these were very important and should be thoroly investigated. He would first have her teeth X-rayed and if any were at all suspicious they should be removed. Then he would have a complement fixation test made. If positive for tuberculosis he would begin with very small doses of tuberculin, first human; second, bovine, but he would be careful to avoid a focal reaction.

### Penetrating Eye Injury.

Dr. Wm. C. C. Bane presented Mr. E. C. C., aged 33, blacksmith. On March 22, 1918, while striking iron with a hammer something struck left eye. There was not much pain at the time, but considerable bleeding. The eye was examined two hours after the injury. Could see hand at 18 inches. There was an oblique cut 6 mm. in length through the limbus at the superior nasal quadrant with prolapse of the iris and hyphema. The prolapsed



iris was excised. The examination with the sideroscope was negative. The X-ray located a foreign body 10 mm. above the horizontal plane of the cornea;  $\frac{3}{4}$  mm. to the temporal side of the vertical plane of the cornea; and, 32 mm. back of the center of the cornea in the orbital tissues. The foreign body had passed thru the eyeball. It measured 2x4 mm. on the plate.

There was freedom from pain and some improvement in vision until the 6th day when the eye became congested and painful. On the 7th day the eye was very painful and on the morn-

ing of the 8th day the pain continued. The eye was congested and there was an exudate showing in the lower part of the anterior chamber with some photophobia of the fellow eye. The enucleation was performed during the afternoon of the 8th day. Examination of the eyeball revealed a posterior scleral wound where the metal had passed thru. The recovery was rapid, and the patient was wearing an artificial eye at the end of the second week.

FRANK R. SPENCER, M. D.

Secretary.

## PHYSIOLOGIC OCULAR TENSION.

(La tension oculaire physiologique.)

DR. A. MAGITOT.

PARIS.

A review of the mechanism controlling the ocular tension in normal eyes, and its reaction to drugs and experimental interference which emphasizes the vascular factor in regulating the intraocular pressure. Abstract-translation from *Annales d'Oculistique*, v. 154, pp. 272, 334, 385, by M. W. Fredrick, M. D.

The subject of ocular tension is a part of normal physiology; it is worth while insisting on this, inasmuch as most treatises on the subject run over into glaucoma and its therapeutics. The fact that the explanation of certain pathologic conditions is still wanting is due to the very narrow view taken of the aqueous and the ocular tension.

It is a matter of common belief that the intraocular pressure is greater than the atmospheric pressure. If a freshly enucleated eye is placed with the cornea upwards and an opening made into the cornea, the endocular fluid will escape. The eye being that organ which receives luminous impressions it must have a constant shape, and must be sufficiently rigid to resist the traction made on it by the external eye muscles. Altho the sustaining coat is dense the eye retains its form only so long as the endocular liquids are not lost by diffusion or evaporation.

THE METHODS OF MEASURING INTRAOCULAR TENSION ARE TWOFOLD.

(1) The direct, or laboratory method. This method is not practical in living human subjects, as it requires the introduction into the eye of a hollow needle, and the production of an immobility not obtainable by ordinary anesthesia on account of the action of the anesthetics on the heart. One would be obliged to resort to curarisation and artificial respiration with all the cumbersome machinery used for this purpose in the physiologic laboratories. The manometric methods follow either Mariotte's law of the compressibility of vapors, or they work with a tube open to the air. The best measuring device for this purpose is Wessely's improvement on Schulzen's device, in which a small capsule is interpolated between the manometer and the eye and marks the findings on a blackened disk.

Ever since Brissaud, in 1709, made his first determinations of hypertension by digital palpation, clinicians have sought better means for determining the intraocular tension. Even the method of Bowman, which is still used too much by ophthalmologists who have learned to use their fingers and have never resorted to instruments of precision, is but a makeshift, as we are dealing with the personal equation, and even strong variations may escape detection. It was but logical that some instrument should be sought which would replace the fingers of the clinician, and this lead to

(2) The indirect method and the invention of the tonometer. In 1863 v. Graefe, Haemmer, and Donders, and in 1865 Dor, each invented an apparatus for this purpose. The many others appearing later proved that none was satisfactory until the well known tonometer of Schiötz made its appearance. The principle employed in tonometers is either that of measuring the force necessary to cause a certain depression in the sclera (Donders, Fick, Nicati), or of measuring the depression in the cornea caused by the application of a fixed pressure (Imbert, Mallakaff). In the Schiötz tonometer both principles are used; it is constructed on the principle of the sphero-cylindrometer. Even this instrument has its limitations, as it is an index of the interior pressure and the depressibility of the ocular coats; and its reading would be completely exact only if:

(1) The elasticity of the ocular coats were the same in the living and the cadaver (it changes very quickly after death);

(2) If the elasticity were the same in all individuals;

(3) If this elasticity did not influence the oscillations of the apparatus. Too much importance, therefore, must not be accorded the readings.

#### NORMAL OCULAR TENSION AND ITS VARIATIONS.

Wahlfors, using a manometer, found a tension of 25 mm. Hg. in a human eye. Toczynski, in a recent review of the results found by his predecessors, obtained the following averages:

In normal subjects between 1 and 25 years, 18.66 mm. Hg.

In normal subjects between 26 and 50 years, 17.48 mm. Hg.

In normal subjects between 51 and 75 years, 17.17 mm. Hg.

It is a well established fact that ocular tension varies with the different animal species: thus it varies in the guinea pig between 10 and 15 mm., in the rabbit between 18 and 25, in the cat between 22 and 30, in the dog between 15 and 25, and in man between 12 and 30. It is worthy of note how small a role the bodyweight plays in the ocular tension. Thus, while there is a difference between the tension in the guinea pig and man, it is but small compared with the difference in body weight, and the cat seems to have about the same ophthalmotonus as man. In this regard it is of interest to note whether there is a relation between blood pressure and body height; thus we find:

Guinea pig (carotid) 111 mm. Hg.

Rabbit (carotid) 100-140 mm. Hg.

Cat (carotid) 130-150 mm. Hg.

Dog (carotid) 140-180 mm. Hg.

Man (femoral) 110-120 mm. Hg.

(In the human aorta the pressure is estimated at 150-200 mm. Hg.)

Blood pressure varies according to racial and biologic differences. So does the ocular tension. While the mean tension in man may be taken as 20 mm., in the northern peoples, according to Stock and Langehan, it is higher; and may vary between 12 and 26 mm. Sex makes no difference. Altitude, however, has a marked influence. Uribe Troncoso has recorded a difference of several mm. between rabbits living on the Mexican plateau and those living in the lowlands. Nicati has shown that in diving bells, under a pressure of two and one-half atmospheres, the ocular pressure was almost doubled in rabbits, and was increased one-fifth in man.

A constant figure is impossible both in man and animals, as the pressure varies not alone with race and age (Wegener found 30 mm. frequently in children as against the average of 15 mm. in old people), but may vary in the same

individual from day to day. Ruata found a difference of 5 mm. between the morning and evening readings in the same person, with parallel variations in the blood pressure of 5 to 10 mm. As with the blood pressure the intraocular pressure is lowered by fasting and anemia; and increased by exertion, inspiration, and asphyxia. Contraction of the extrinsic eye muscles increases the tension, the muscles innervated by the third pair being more influential than those innervated by the fourth pair, according to Wessely, Lederer and Levinsohn, and contrary to Groenholm's findings. Levinsohn finds that the contraction of the intrinsic eye muscles raises the tension because it increases the circulation, but Hess and Heine could not confirm his results in their observations.

#### ANATOMIC DETAILS.

The outer wall of the eyeball, the cornea and sclera, are not absolutely rigid, but are elastic within very narrow limits. There is no rigid tissue in the body except bone, and all connective tissue is more or less extensible, especially when it contains elastic fibres. Even in those animals in which there are large inserts of cartilage and bone in the sclera the cornea still makes changes in form possible. This elasticity of the outer tunic is, as already stated, of low degree, as shown by the experiment of Koster, who found that to raise the tension in a rabbit's eye from

5 to 10 mm. Hg. meant the introduction of 6 mm. of liquid.

10 to 20 mm. Hg. meant the introduction of  $3\frac{1}{2}$  mm. of liquid.

20 to 30 mm. Hg. meant the introduction of 1 mm. of liquid.

30 to 40 mm. Hg. meant the introduction of  $\frac{3}{4}$  mm. of liquid.

40 to 100 mm. Hg. meant the introduction of  $\frac{1}{3}$  mm. of liquid.

The choroidal tunic is much thicker in the living than in microscopic sections owing to the collapse of the choroidal vessels. This thickness is not 50 to  $80\mu$ , as determined by R. Greeff in man, but 200 to  $300\mu$  (Venneman), or even as high as 300 to  $350\mu$  in frozen sections taken from the neighborhood of the optic disc in the new-born (Wolfrum). In

old people, due to the sclerosis of the vessels, the thickness of the choroid is reduced by one-half. This great vascular development of the choroid is not intended to maintain the temperature of the retina, so as to insure the proper functioning of the retinal nerve elements, as this is amply provided for by the surrounding blood vessels and tissues, such as the muscles, orbital fat, eyelids, etc. The real purpose of this large arterial supply and of the venae vorticosae, for which there is nothing analogous in the pia mater of the cerebral centers, is the maintenance of a tonus sufficient to counterbalance the action of the extrinsic muscles, or of any predominant set of muscles, and thus to assure to the eye its form. The choroid must, therefore, be considered an erectile organ, identical with the *rete admirabile* of the fishes, the so-called choroidal gland. (The significance of this choroidal gland is not clear. It has been supposed to have to do with the accommodation, but it is more likely to be a regulator of the pressure of the eyelids according to depth. Amphibia have a much thicker eyecup than terrestrial animals). The choroid contains a considerable number of elastic fibers in the lamina fusca, the walls of the larger vessels, and in the chorio-capillaris. Iwanoff has found non-striated muscle fibers accompanying the vessels. Besides, the cavernous system of the choroid has a nerve regulating organ, whose branches, both medullated and non-medullated, form a network in the lamina fusca, and receive numerous branches from the ciliary nerves, the whole constituting the vasomotor apparatus for the arteries and the chorio-capillaris. The choroid has, furthermore, a number of ganglion cells of the sympathetic type (multipolar). This assembly of nerve cells constitutes a veritable intraocular ganglion (H. Muller), the regulatory importance of which will be shown later on.

We must keep in mind that we have two independent territories in the vascular system of the eye: one caring for the retrobulbar segment and the retina; and the other for the uveal tract and the sclera, including some of



the episclera. The most important source for the uveal tract are the posterior ciliary arteries, about twenty in number. The posterior long and the anterior ciliary arteries contribute in a modest way to the arterial supply. The veins are two or three times more numerous than the arteries, and are of much larger caliber. They arise suddenly from the fusion of about fifteen capillaries which meet in a small vortex, and in turn form larger vortices, called *venae vorticosae*. The anterior segment of the eye is also rich in veins, for instance the ciliary region, the ciliary processes being almost entirely made up of bunches of veins. In spite of the seemingly large number of anastomoses between the anterior and posterior venous systems, the suppression of either leads to a marked venous stasis of the eye.

#### RELATION OF THE OCULAR TENSION TO THE GENERAL CIRCULATION.

While the tension of the eye will, generally speaking, be lowered by a diminished flow of blood from the internal carotid, and increased by an impediment to the venous flow, we must not forget that the eye has a local regulating system, which allows it to equalize and distribute the blood within its walls according to local needs. This contractile reservoir will be called upon to equalize variations of pressure coming from outside the eye, so that the eye is under the influence of the general blood pressure up to a certain point only. This explains how the eye can maintain a tonus necessary for its efficient functioning, and why a rise of 80 mm. in the carotid pressure will cause a rise of 8 to 10 mm. only in the ophthalmotonus. Another thing to consider is that the blood pressure sinks as we approach the periphery, so that while the blood pressure in a dog's carotid is 140 mm. it is 130 in the *dorsalis pedis*, and much less in the ciliary arteries.

While the pressure in the jugular is negative, a fact which makes us fear the opening of the larger veins of this system, the emissary veins of the eye are under positive pressure, possibly

of 8 to 9 mm. Hg. But the pressure in the veins within the eye must be much higher, otherwise they would flatten under the intraocular pressure of 20 mm., thus showing the importance of the regulating reservoir within the choroid. Apart from these local phenomena we may assume that the ocular tension stands under the influence of the general circulation, and responds to the anemia and stasis which manifest themselves in the large vessels.

Slowing of the heart or opening the thorax bring about hypotension. Stopping of the heart in a rabbit lowered the tension from the normal tension of 18 to 25 mm. to 8 mm., and Nicati has seen a like result produced in man by syncope or death, as measured with his sclerometer. Section of the spinal marrow, which suppresses the principal excitor of the heart, or the stimulation of the depressor nerve of Cyon brings about the same condition. In a rabbit, in which the ocular tension had been raised to 64 mm. by artificial inflammation, cutting the vagus and exciting the stump caused a drop of the ocular tension to 34 mm., the blood pressure dropping from 140 to 80 mm., the two curves showing an absolute parallelism and synchronicity.

The percentage of drop in the ocular tension will, however, be greater if the ocular tension was above normal before the experiment, and will then more closely approximate the percentage of drop in the blood pressure. If a difference in tension existed between the two eyes the proportional drop will be much greater in the eye showing the higher tension. Tying one carotid in a rabbit with an initial tension of 20 mm. produced a drop of 5 mm.; tying both carotids produced a drop of 6 mm. To explain the small amount of decrease we must remember that in the rabbit the blood supply for the eye comes largely from the vertebral arteries, so that the drop is not as great as it would be were it not for this accessory supply. The drop is temporary, and, if the time of compression does not exceed one minute the tension rapidly resumes its former height.

As a corollary to the decrease of tension due to decreased blood supply one would think that an increase in the blood supply would give rise to an elevation of ocular tension; this it does, but in a far less degree than the decrease in blood pressure, thus again proving the influence of the regulating organ situated in the eye. Aside from the elevation due to rapid inspiration and exertion, changes which can hardly be noted with precision, Heine has shown that injecting artificial sera into the veins of a rabbit sends the blood pressure up to 300 mm., and the intra-ocular tension to 100 mm. Hg. In a rabbit, in whose left eye the tension had been raised from 20 to 43 mm. by subconjunctival injection of a salt solution, compression of the abdominal aorta raised the tension in the untouched right eye to 26 mm., and in the left eye to 47 mm., showing that the relative rise in tension is greater the lower the tension was before the augmentation of blood pressure. Were we to accept the classic theory that the hypertension is brought about by an active secretion of the aqueous humor, we would be forced to assume that an increase in the liquid contents of the eyes would exaggerate an already high tension; we find, however, that an eye already under high tension seeks to defend itself against a still higher tension.

Section of the heart moderator nerve in a curarised cat (Wessely), raised the blood pressure from 150 to 180 mm., and the ocular tension from 25 to 28 mm. Exciting the cut end brought the pressure and tension down, but they regained the former figures when the excitation ceased. Thus, altho there is a parallelism between the two curves, the increase in ocular tension is small. Compression of the superficial cervical veins has little effect, as the return flow thru the medullary veins is ample. In order to have any marked effect on the ocular tonus one would have to compress all the cervical veins, which is difficult to do, an approach to which is made in the Bier method, in connection with which Renner, Hoppe, and Schirmer studied the

effect in man of cervical compression, and found it without influence on the ocular tension. Whereas Wessely agrees with Schultze, after a series of experiments on curarised animals, in whom he determined at the same time the blood pressure in the carotid, as variations in the blood pressure would invalidate the eye findings. He found that cephalic venous stasis causes a slight rise in the ophthalmotonus, which he attributes to exophthalmus.

While, in a general way, the blood pressure and the ocular tension show a certain amount of parallelism, the disassociation of the two is not alone possible, but frequent. The low tonus in old people has already been mentioned. It is surprising to find normal, or even lowered, tonus in nephritics, subjects of hypertension, and cardiorenals. While the injection of serum into the veins produces a marked rise in both blood pressure and ophthalmotonus, the injection of adrenalin into the veins while increasing the blood pressure in the larger vessels considerably, produces either no change in the ophthalmotonus or causes it to fall, as a result of the vasoconstriction which takes place in the ocular vessels, thus again evidencing the importance of the physiologic individuality of the eye.

##### (5) RELATION OF OCULAR TENSION TO THE LOCAL CIRCULATION.

As the manometer cannot be applied to the small vessels constituting the erectile tissue of the uvea, we are obliged to draw conclusions from other well known facts. We know that an intraocular tension higher than the vascular pressure would suppress the local circulation. Pressure on the globe increases the tonus of the globe and brings into play venous pulsation which is not perceptible under normal conditions. If we suppress the blood circulation in the eye there results an immediate lowering of the ocular tension, as, for example, we have in death. In a freshly killed rabbit the tension sank from 20 to 8 mm. Hg. By injecting Ringer's solution into the carotid, O. Weiss restored the tension of 20 mm. Hg.

T. Henderson thinks the intraocular pressure is quite comparable to the intracranial pressure as studied by Hill, and shown by him to be equal to the venous pressure; and recalls the fact that liquids always tend to adjust themselves to the lowest level. The comparison of the bony skull with the eyeball is unfortunate, as the sclera possesses a certain amount of elasticity, even though that may vary. O. Weiss' reasoning is more alluring: If in a dog's aorta, the blood pressure is 170 mm. Hg., dropping to 140 in the carotid, and to 130 in the dorsalis pedis, it should be 50 to 70 mm. Hg. in the ciliary arteries during the diastole, and suffer a further loss to 40 to 60 mm. Hg. by capillary reduction. When we remember that the normal intraocular pressure in the dog is 15 to 25 mm. we see that the difference between the two pressures is sufficient to preclude compression of the ocular vessels. While we have no means of verifying Weiss' figures we must assume that they are very near the truth; altho they may be too high, as we know that a very moderate compression of the eye will make the venous pulse appear.

#### (A) THE OCULAR PULSATIONS.

Although neither felt by palpation nor seen with the ophthalmoscope the oscillations due to the impulses of the choroidal blood flow can be perceived by the tonometer of Schiöetz, and still better by the registering manometer. On a rabbit Wessely found the amplitude of oscillation 0.4 mm. with an ocular tension of 25 mm. Hg.; at 45 mm. the amplitude for 1.4 mm.; and, with a tension of 70 mm. Hg. it was 2.5 mm. When the ocular tension sank below 15 mm. no oscillations were registered. This explains the fact that the tonometer needle does not always show oscillations. The graphic method shows the ocular pulse to be slightly behind the carotid pulse.

If in a curarised rabbit, in whom the carotids show a fixed pressure, ocular hypertension is induced by hyperemia, the higher the ocular tension goes, the wider the oscillations of the ocular pulse. The increased amplitude of os-

cillations cannot, therefore, be attributed to the beating of the orbital arteries, we must assume that it is the greater or lesser fullness of the eye vessels which give rise to (a) ocular hypertension; (b) ocular pulsation. Without this, one could not understand how an intraocular tension of 70 mm. Hg. could exist without a complete flattening of the choroidal vessels.

We must not confuse these "active" ocular pulsations with those which we see with the ophthalmoscope when progressive digital pressure is applied to the eye. We then see pulsations first in the veins and then in the arteries; finally the arteries become empty. These pulsations are always present, and may be made perceptible by using the apparatus of Gullstrand (Speyr); pressure simply increases their amplitude. We are here dealing with "passive" pulsations in nonencapsulated vessels which pass thru a rigid strait, the lamina cribrosa. Attention is called to the fact that the beats are manifest in the most central part of the papilla and reach the borders of the papilla in exceptional cases only. The mechanism of this can be understood if we remember that the normal jugular pulse is due to the period of pause in the blood wave at the moment of the auricular systole.

#### (B) ACTION OF THE ARTERIAL PLEXUS.

It is quite evident that the retinal territory is without influence, and that the suppression of the central artery and its network has nothing to do with tension. The changes which we see in these vessels before or after a glaucomatous crisis are simply coincident with a generalized angiosclerosis. Entirely different is the import of the ciliary network, which Wagenmann was about the first to subject to experimental section and ligature. Unfortunately Wagenmann's experiments were made on rabbits whose anatomic formula is slightly different from that of man, inasmuch as the rabbit has no anterior ciliary arteries and its posterior ciliary arteries are terminal.

Wagenmann found that section of a long and short posterior ciliary artery



induces only transitory hypotonus, because the other arteries undergo a compensatory hypertrophy. If, however, all the long and short posterior ciliary arteries are tied, the globe at once becomes flabby and soft, the anterior chamber disappears, and the eye atrophies. The choroidal plexus has been deprived of its entire blood supply. In man the operation of opticociliary resection, recommended for certain forms of glaucoma, has afforded us an opportunity of studying the effect of sectioning the posterior ciliary arteries. But the results are of small value, inasmuch as the hook is blind, and the operator cannot feel just which vessels he has cut; furthermore, the accompanying section of the nerves often gives rise to a keratitis. This much is certain, that suppression of an important blood supply diminishes the tension of the globe.

#### (C) ACTION OF THE VENOUS PLEXUS.

As already stated there are two venous territories in the eye; the posterior made up of the *Venae vorticosae*, and the anterior made up by the anterior ciliary veins. Contrary to the classical opinion that the posterior territory is the only one of importance to the eye, Henderson has shown that the anterior group also plays a considerable role in the physiology of the eye. Adamuck seems to have been the first to occupy himself with the vorticosae veins. After ligating these vessels he noted a rise in tension to 70 mm. Hg. in the rabbit; and to 90 mm. Hg. in the cat. Koster and Weber obtained like figures; but they found that it was necessary to ligate all four vorticosae veins to obtain a lasting result. Otherwise the hypertonus changes rapidly into a hypotonus, followed by pigmentary lesions of hematogenous origin, modifications of the pigment epithelium, alterations in the visual cells, and obliteration of the anterior chamber with iridic adhesions. Arlt, Exner, and Van Geuns came to similar conclusions.

#### IMPORTANCE OF THE ANTERIOR CILIARY PLEXUS.

In 1905 Bartels, while practising the subconjunctival ligature of the tendin-

ous insertions of the recti muscles in dogs, noted that after the ligation of the last tendon the tension rose to 80 mm. Hg. and more. Several hours later marked conjunctival edema set in and the retinal vessels showed narrowing. This was followed by hematoma near the limbus, the cornea became cloudy and anesthetic. There was dilatation of the pupil, but the anterior chamber suffered no change. Thus we see the ligature of the anterior ciliary veins produces a greater hypertension than the suppression of the vorticosae veins; and one which is more lasting. It was watched during five months in a dog, without producing papillary excavation or obliteration of the iridocorneal angle. This proves the importance of the return thru the anterior veins, and the small value of the anterior ciliary arteries. These latter, as already stated, are absent in the rabbit, but luxating the eyeball will produce hypertension in the rabbit because of the constriction of the tendinous insertions of the muscles by the eyelids.

#### (D) ACTION OF ENDOCULAR HYPEREMIA.

The methods of inducing hyperemia of the globe are twofold: those inducing passive hyperemia, and those inducing active hyperemia. The hyperemia due to the ligation of the anterior and posterior venous territories has just been described. Another method, and one which possesses considerable clinical interest is the method of inducing hyperemia by suction. Wessely, using a curarized animal, showed that the pressure in the carotid remained fixed, but that the ocular tension rose sharply, attaining its height in 30 to 40 seconds, whence it slowly receded. If the suction is discontinued there is a sudden decrease in tension, which sinks to a lower level than that which obtained before beginning the experiment.

Often a very intense exophthalmia is produced, accompanied by chemosis and edema of the lids. This is due to the stasis in the periocular tissues, which is sometimes so considerable that orbital and palpebral hematoma

appear. This stasis may be responsible to a certain degree for the rise in eye tension, by compressing the emissary veins of the eyes. The main reason for the rise in tension is the extreme repletion of the erectile tissue in the uvea; which is so great that the vessel walls are taxed to their utmost. The sudden onset of the hypotension when suction is discontinued led to the hope that this might be an important therapeutic agent in the treatment of glaucoma; but here again the difference in the conduct of a healthy and a diseased organ was overlooked. The hypotonus, due to an acute distention of the globe, is but temporary, and is gradually replaced by a tension which is even higher than the initial tension.

Active hyperemia can be brought about by the mechanism of inflammation. There are many agents for accomplishing this, the least painful being sodium chlorid, which has been largely used clinically. It is of interest to the physiologist, inasmuch as it provokes a reflex vasodilatation. A 0.7 per cent solution is absolutely without effect, hence the inefficiency of normal physiologic serum. To produce an effect on the ocular tension one must use solutions of at least 5 per cent. Above this strength the more concentrated the solution the more violent and lasting the effect. Wessely has shown that one cc. of a 5 per cent solution produces the same effect as  $\frac{1}{2}$  cc. of a 10 per cent solution; but that a cc. of a 10 per cent solution produces a much greater hypertension.

The explanation for this lies in the fact that the organism does its own diluting, so that in three-quarters of an hour a 5 per cent solution has been diluted to a 0.7 per cent solution, that is, an isotonic solution. Starting with 20 mm. Hg. in a curarized rabbit the injection of  $\frac{1}{2}$  cc. of a 10 per cent solution of salt started an increase in tension after one minute; and in fifteen minutes a tension of 60 mm. had been reached. After remaining stationary for a while the tension sank to a point below the initial tension; but this last phenomenon may be due to the general loss of pressure in an animal after pro-

longed curarization, as it was found in the other eye also.

That this hypertension is not due to osmosis into the anterior chamber of the sodium chlorid is proven by Wessely, who found the sodium content of the anterior chamber unchanged in living animals, as long as the strength of the solutions did not exceed 15 per cent. Whereas, in the dead animal, an injection of a 5 per cent solution considerably increased the NaCl. content of the anterior chamber, caused hypotonus, and opacification of the cornea. That the hypertonus is not due to venous compression brought about by the distention of the tissues is proved by the fact that a 0.7 per cent solution is inoperative. That it is due to internal hyperemia is proved by the fact that an intravenous injection of adrenalin will arrest a beginning rise of tension. The effect of injecting under the conjunctiva various chemical substances will be regulated by their ability to set up a reflex vasodilatation in the interior of the eye. Witness the injection of sublimate.

But, it is not necessary to use these liquids in subconjunctival injection to get this result. Instillation of irritating liquids into the conjunctival sac will suffice. So will traumata of the cornea, or cauterization of the cornea or limbus. All these procedures increase the albumin content, and bring into play the antibodies. This appearance in the aqueous of substances which are normally found in the serum must be interpreted as the transudation of serum thru the dilated capillary walls. The increase in tension and the passage of albumin into the aqueous are parallel phenomena, both due to intraocular hyperemia.

#### (6) INNERVATION AND OCULAR TENSION.

This is a very intricate chapter. The innervation of the eye is one of the most complex subjects of anatomo-physiology, on which but little light has been shed by the studies published so far. The cause for this lies in the fact that experimental research on the human being is impossible, and that the studies on "laboratory" animals are really

but a chapter in comparative physiology. Added to the different methods of research are the anatomic variations in the animals employed. The rabbit, for instance, differs in certain details from the dog and cat; and these latter two again present differences. The ophthalmic ganglion of the dog is of the mixed type (cells of the spinal and of the sympathetic type), whereas in the cat we have cells of the sympathetic type only. This is stated for purposes of illustration only, as up to the present it seems demonstrated, contrary to Nicati's belief, that the ciliary ganglion is without influence on the ophthalmotonus. Of course, there is a general anatomic scheme which holds good for all mammalia with certain variations in the species; a good example of this is the sympathetic system.

According to many authors there seem to be two nerves only which have to do with the ocular tension: the trigeminus and the sympathetic.

The ophthalmic branch of the *trigeminus* nerve sends nerve fibers to the eye either by the direct route of the long ciliary nerves, or through the indirect route of the short ciliary nerves. These latter are the efferent branches of the ophthalmic ganglion. We also know that those fibers of the fifth nerve which pierce the long root of this center pass thru it without giving off filaments, at least the purely sensitive ones do. Doyon, Morat, and F. Frank have studied the action of the trigeminus by working on the ophthalmic nerve close to the Gasserian ganglion, or on the trunk of the trigeminus where it leaves the bulb. In the dog they have shown that section produces hypotonus, irritation hypertonus.

In these experiments the essentially sensitive trigeminus is only indirectly concerned; the results obtained are in reality due to the sympathetic filaments which it contains, these filaments being vasodilators and vasoconstrictors, as proved by the following experiment. Exciting the trigeminus or the sympathetic in dog or cat raises the ocular tension, and with the ophthalmoscope one can see the dilated retinal vessels. If one starts with sec-

tioning the trigeminus, the exciting of the sympathetic of the same side has no effect on the ocular tension. If, for purpose of control, the sympathetic of the other side is excited we have vasodilatation and rise of tonus in the control eye.

The analysis of these two experiments shows us that the ophthalmic nerve, if it contains sympathetic filaments, has those of vasodilating nature. By sectioning the trigeminus or its branch, the ophthalmic nerve, these vasodilators are put out of commission, and the vasoconstrictors become predominant, with the result of lowered eye tension due to lessened volume of blood. Thru the studies of Doyon, Morat, Dastre and F. Frank we know that the sympathetic filaments reach the trigeminus either by way of the bulb (vertebral nerve of B. Frank), or by way of the sympathico-gasserian anastomosis. The part played by the trigeminus in the regulation of ocular tension becomes, therefore, nil, and the only nerve concerned is the sympathetic.

The *sympathetic* cervico-thoracic portion does not send an autonomous nerve to the eye; the sympathetic fibers come from the vertebral nerve and from the superior cervical ganglion. Those from the vertebral nerve come by the bulbus route; which it leaves when it penetrates the trunk of the fifth nerve to accompany the ophthalmic nerve, and its nasal branch to penetrate the eye in company with the long ciliary nerves. Some of the fibers follow the long root which the nasal nerve gives off to the ophthalmic ganglion; and, passing over to the short ciliary nerves, reach the sclera with these latter. Of the fibers coming from the superior cervical ganglion, some pass into the gasserian ganglion thru F. Frank's sympathico-gasserian anastomosis, and into the ophthalmic nerve, where they join the fibers of bulbo-vertebral origin. Others leave the superior cervical ganglion and mix with the plexus surrounding the internal carotid. From this carotid plexus comes the sympathetic root of the ciliary ganglion. We do not know



whether this root gives off anything to the ganglion, or whether it simply passes thru it, to enter the globe in company with the short ciliary nerves. All we know is that this root contains, besides vasodilator filaments vasoconstrictor filaments, being the only one to contain both, as the ophthalmic nerve contains vasodilators only.

From these anatomic details with which we have become acquainted thru physiology we see that the sympathetic system of the eye is a singularly complicated one; and is made more complicated by the fact that the superior cervical ganglion is not an autonomous center for the filaments which leave it. Certain filaments simply pass thru it, after being received from the cervical portion of which it is the upper extreme part. The same may be said of the vertebral nerve, which is

formed by the *rami communicantes* of the last cervical and the first dorsal roots. It is, therefore, in the cervico-thoracic medulla that we must look for the primary vasomotor centers of the head and eyeballs.

We have thus many points of attack in our experiments. To take as an example of the effect on the eyes, recall that section of the cervical sympathetic brings on exophthalmos, miosis, and (perhaps) a modification of the curvature of the lens; whereas, the irritation of the same nerve gives rise to the opposite, namely the syndrome of Basedow. The study of the relation of the sympathetic to ocular tension goes back to 1866, and the investigators included some of the best known in ocular physiology. To show the diversity of their findings the following table will be of interest:

#### DIVERSE RESULTS OF EXPERIMENTS.

- |  |  |
|--|--|
| (a) Section of the cervical sympathetic.               | No effect on tension (Grunhagen, Hippel).<br>Diminished tension (Neuschuler, Hertel).<br>Rise in tension and dilatation of the retinal vessels (Doyon, Morat). |
| (b) Irritation of the cervical sympathetic .....       | No effect (Grunhagen and Hippel).<br>Slight rise of tension (Wegner).<br>Lowered tension even after irritation had ceased (Schulten, Doyon, Morat).            |
| Experiments on Rabbit.                                 |  |
| (c) Irritation of the superior cervical ganglion ..... | Increase of tension (Doyon and Morat).   |
| (d) Irritation of the thoracic sympathetic .....       | Lowered tension (Grunhagen, Hippel).   |
| (e) Irritation of the carotid filament...              | No effect (Angelucci).   |
| Experiments on the Dog, or Cat.                        |  |
| (a) Section of the cervical sympathetic.               | No effect (Grunhagen and Hippel).<br>Lowered tension (Petit, Donders, Adamuck, Hertel, Neuschuler).  |
| (b) Section of the upper cervical ganglion .....       | Increased tension (Grunhagen, Hippel).<br>Lowered tension (Wegner, Dimitrowski, Angelucci, Schulten).  |
| (c) Irritation of the cervical sympathetic .....       | Increase of tension and of retinal circulation, production of Basedow's syndrome (Doyon and Morat).  |
| (d) Irritation of the superior cervical ganglion ..... | Increase of tension followed by a fall and finally hypotension (Grunhagen and Hippel, Bellarminoff, Graser, Henderson and Starling).                           |

Add to this that Lodato after passing a silk thread thru the superior cervical ganglion asserts that he observed lasting hypertonus due to the presence of this foreign body.

The contradictions in the foregoing table are more apparent than real. If the experiments are conducted with good instruments, a rational technic, sufficiently prolonged observation, there will be concordance of the final results. The differences are transitory only, and can often be accounted for by inequalities in technic and in the sensibility of the animals used.

#### IRRITATION OF THE CERVICAL SYMPATHETIC.

In a curarised rabbit, on the opposite side the registered blood pressure in the carotid shows no variation during the experiment. By Faradic irritation of the sympathetic during 30 to 120 seconds with a current sufficiently strong to induce mydriasis of the same side, in 16 cases Wessely obtained identical results, a constant hypotension. This begins a few seconds after irritation is begun; when this ceases the maximal drop is attained and persists for some time, and the tension does not return to its original level. As the ocular tension falls the oscillations of the ocular pulse disappear.

In a curarized dog or cat, the registered blood pressure or the carotid on the opposite side shows a slight rise in the cat, and a strong one in the dog. The tension, after an increase of 4 to 6 mm. Hg., drops rapidly and remains below normal during the time the current is passing. When the current is stopped the tension returns slowly to the initial point, and the ocular pulsations, which had disappeared, again become manifest.

The explanation of this difference in behavior at the beginning of the experiments is that the increase in tension is due to a venous stasis which causes a protrusion of the eyeball. As this stasis is less pronounced in the rabbit than in the cat or dog the former shows a drop only; whereas there is a momentary rise in the latter animals. As to the presence of a silk thread in the superior cervical ganglion causing hypertonus (Lodato), that experiment will not stand a rigid in-

vestigation, as the result here is not due to irritation but to a degeneration of the ganglion, which places it on a par with the result of resection of the sympathetic. As to the dilatation of the retinal vessels, this can be explained by anatomic variations. Wessely thinks that the cat has one innervation for the choroidal, and another for the retinal vessels. This need not astonish us when we reflect that the ciliary ganglion of the cat is anatomically different from that of the rabbit. Furthermore, we have proven that irritation of the sympathetic produces greater results in the rabbit than in the cat or dog, and we must recall the difficulty of producing cephalic stasis in the rabbit on account of the ample supply of blood from the vertebral region. In similar ways many of the apparent contradictions may be explained.

#### SECTION OF THE SPINAL SYMPATHETIC.

With the curarized rabbit (Wessely), blood pressure in the carotid on the opposite side shows negligible variations. After section of the sympathetic on the left side, after one or two minutes a rise in tension of left eye of 18 to 20 mm. Hg. occurs. The tension of the right eye shows a slight drop of 1 mm. Hg. Five minutes later the tension of the left eye begins to drop, and has reached the initial tension 15 minutes later. On the other hand, pulse and respiration have increased. Going back to the classic experiment of Claude Bernard, showing that section of the sympathetic causes a marked dilatation of all the vessels of the head, the only thing that surprises us is that the hypertension of the eye should not be more pronounced. Here we encounter the autoregulating device of the eye, which we considered when we were studying the relation between general blood pressure and ocular tension.

#### SYMPATHETIC CENTERS AND OCULAR VASOMOTOR NERVES.

The vasomotor nerves have often been described as valves which regulate the flow of blood, and the blood pressure in the different organs. This mechanism is under the control of centers of the first, second and third order.

A center of the first order is the bulbar center which lies on either side of the median line, at the level of the floor of the fourth ventricle. If this region is irritated electrically there is a general increase in the arterial pressure; if it is destroyed we have the opposite result. The fibers coming from this center descend along the anterolateral columns of the spinal cord, in which there exist, probably, accessory centers. Cutting the cord from below upwards brings on successively vascular paralysis of the region corresponding to the segment; and, vice versa, electric irritation of a segment of the cord produces elevation of the blood pressure of the region innervated by this segment. The sensitive impressions are conveyed both to the cord and the bulbus; and their role is the more clearly understood if we consider that they constitute the summit of the reflex arc.

The centers of the second order are the thoracic or cervico-cephalic ganglia. This is what makes the superior cervical ganglion important, the regulation of the ocular circulation. Thru their influence these centers can, up to a certain point, compensate for the experimental suppression of the bulbo-medullary centers. If to the mutilation of the latter, we add the destruction of the former, the result will be magnified. This explains why the experimenters on the influence of the sympathetic on the ocular tension have obtained more marked results from the destruction of the ganglion, than they have from the simple section of the cervical chain.

The centers of the third class are the peripheral centers situated in the organs themselves. Under the heading "anatomic details" it was shown how rich the choroid is in nerve cells (H. Müller's ganglion). This organ is particularly important for the eyeball, and its action manifests itself under widely varying conditions. For instance, it asserts itself when the superior cervical ganglion is resected, the effect of which it partially neutralizes. It is a well-known fact that the phenomena constituting the syndrome of Pourfour Du-

petit, falsely called the syndrome of Horner, are not permanent, but tend to disappear after several weeks.

In the experiments of Henderson and Starling, and of Wessely (injection of adrenalin into the vein), it is this organ which prevents the considerable elevation of blood pressure from causing a parallel rise in the ocular tension. It is this same organ which moderates the effect on the eye which we have described as produced by compression of the jugulars, or compensates the results of cutting the vagospinal or the cervical sympathetic. Even more evident is its action in the local inflammation produced by the subconjunctival injection of a strong solution of salt, bichloride of mercury, and similar fluids; or the irritations due to the experimental introduction of foreign bodies into the anterior chamber. In the latter case the result is often the inverse, namely vasodilatation and hypertonus.

From the sympathetic centers issue constricting and dilating fibers, which are not, strictly considered, antagonists. The constrictors are tonus producers, whose action can be readily understood when we consider that the vessels possess a circular musculature; and that a reduction of the caliber of the vessels is brought about by the action of the constrictors, with a resultant rise in the blood pressure above the point of action, and a corresponding fall of pressure in the veins below the point. The vasodilators, on the contrary, can have no direct action in the vessels, inasmuch as the vessel walls do not contain longitudinal muscles. Being without direct influence in the musculature their sphere of action lies in their influence on the constrictor nerves. This explains the lack of effect if one sections the dilators, and the intense effect of stimulating these same dilators.

This effect is naturally much greater when the vessels are contracted than on vessels already dilated; which explains the minimal result when one tries to increase the tension in an eye in which the tonus is already high, or,



in other words, in which the choroidal vessels are already dilated.

It would seem, therefore, that the dilators act by paralyzing temporarily the constrictors. In a general way the cervical sympathetic and, current opinion notwithstanding, the vasoconstricting filaments for the eyeball predominate over the dilators. This predominance explains the fact that irritation of the cervical sympathetic brings on a lowering of tension, out of all proportion to that caused by simply cutting the nerve. In the eye we must take into account the vasomotors which emanate from the nerve cells of the choroid; or, in other words, from the peripheral center. It is safe to assume that, altho the eye receives the greater part of its constrictors from the cervical ganglion, it is from the choroidal ganglion that arise the major part of the dilators. It is in this way that the hyperemia due to physical and chemical excitants (cauterization of the limbus, electrolysis of the angle, subconjunctival injections of sublimate, etc.), which are used to produce an artificial rise of tension is brought about.

#### AQUEOUS HUMOR AND TENSION.

Here we come to the kernel of the matter, and in this chapter will be found many heresies for those who believe in the classic theories of Leber, Ulrich, Priestley Smith, and others, which accept a current in the anterior chamber, and an angle of filtration, to which they cling as tho they were old friends. Very seductive, indeed, is the hypothesis of perpetual secretion of aqueous humor regulating the tension, very plausible, this outlet thru Schlemm's canal, a valve, as it were, the choking of which is fraught with the gravest consequences. Nothing more erroneous, when one studies and analyzes a little more closely.

Up to the present the subject of ocular tension and aqueous humor have been kept apart intentionally, and their perfect independence thus established. There is no link between them. Ophthalmotonus is a purely mechanical thing, inasmuch as it is regulated solely by the greater or less repletion

of the vessels of the uvea. The aqueous humor, as shown in a previous article, is a matter of histology and biology. Its relation to ocular tension lies in its bearing the consequences of experimental or pathologic vasodilatation, and nothing else. It acts as a buffer when the ocular tension passes beyond certain limits.

The aqueous humor which leaves the retina and fills the anterior chamber (the vitreous is nothing more nor less than retinal neuroglia), belongs to that class of liquids which might be designated as mineral sera. Very rich in NaCl, it is a splendid medium for maintaining the retinal cells in a state of normal excitability; but its poverty in protein elements deprives it of assuming a nutritive function. The duty of nutrition belongs, anyway, to the blood, with which the eyeball is so richly provided. The aqueous humor is not undergoing continuous secretion or dialyzation. On the contrary, it is a very sluggish stream, whose resorption takes place, without doubt, thru the veins, as is generally done thruout the organism. The details of this have been given in the *Annales d'Oculistique* for February, March and April, 1917. Here we shall take up a few points only.

After paracentesis of the anterior chamber we find this space rapidly refilled with a liquid, called aqueous humor of the "second formation." This new humor has not the composition of the original humor, but contains fibrin, albumin, and numerous other substances which abound in the serum of the blood. We have now to determine whether these substances remain in the new aqueous indefinitely, or whether an aqueous of original composition can be found in a globe that has once been tapped. It has been asserted that these foreign substances disappear from the aqueous with greater or less rapidity, and this is one of the arguments of the supporters of Leber's theory of a current in the anterior chamber. They claim that the disappearance of hyphemas and hypopions in an eye that has not been tapped is a further support of their theory.

But they are wrong, because: We see subcutaneous hematomata disappear without imputing their removal to a liquid current; we know that their disappearance is the work of cells, phagocyte, lymphatic and connective. In a recent article Leboucq has shown us how this takes place in the eye. If a drop of neutral sterile oil is brought into the anterior chamber we can watch its breaking up into fragments, and the penetration of these oily particles into the iris. When these particles reach the root of the iris they are swallowed by leucocytes, which carry them thru the scleral cup by way of the emissary veins. Once outside of the eye these droplets again become free, and one can see them agglomerate themselves in the lymphatics of the orbit. This proves that foreign substances can be eliminated from the aqueous without the elimination of the aqueous itself. (We cannot assume with Leboucq that the aqueous is lymph, as the chemical composition of the two fluids is entirely different).

The fluid which refills the drained anterior chamber is composed of the remainder of the aqueous which laved this veritable fibrillar sponge called the vitreous; and serum transuded from the capillaries distended by the fall in pressure caused by the puncture of the anterior chamber. The aqueous of "second formation" is, therefore, a mixture of normal aqueous, brought forward by the fall in pressure, and of a certain amount of blood serum. In proof of this we have: If, after death, we empty the anterior chamber, we see it refill. Deutschmann, who noted this fact a long time ago, concluded that this was the result of forward transudation of the vitreous. It cannot be fibrillary vitreous, but liquid vitreous that he has in mind.

We can suppress this phenomenon. If, before puncturing the anterior chamber we inject under the conjunctiva pure adrenalin, whose vasoconstricting power is very great, the anterior chamber will fill feebly and slowly with a small quantity of liquid whose composition is that of the normal aqueous. The process is, there-

fore, the same in the living and the dead subject.

The experiments of Ehrlich and his imitators, who injected fluorescein into the venous circulation, to see it reappear either thru the pupil or on the anterior surface of the iris, is another argument of the proponents of a continuous secretion of the aqueous humor. These phenomena have been generalized and incorrectly interpreted. It is true that one sees in the intact eye of the rabbit a green line at the level of the pupil, a few instants after the injection of fluorescein. But this is a phenomenon restricted to the rabbit, and does not manifest itself in man or monkey under normal conditions. There is a way, however, of provoking it in these latter, and that is by inducing hyperemia either thru an irritating subconjunctival injection, or thru mechanical irritation of the cornea. We must, therefore, conclude that the passage of fluorescein into the aqueous humor is due solely to the transudation of this substance thru the dilated capillaries; and, if in the rabbit it takes place in normal eyes, it can be explained by the greater permeability of the ocular vessels in the rabbit. Besides, the amount of fluorescein introduced into the vein must be considerable in proportion to the bodyweight.

Even conceding that the liquid reforming after puncture is a mixture of aqueous and blood serum, how shall we explain the rapid return of the eye to normal? The explanation is easily given. If we empty the anterior chamber on the cadaver we see the chamber refill almost completely, but the tension remains about 8 mm. Hg. below the anteoperative tension. If we repeat the experiment on the living the tension reestablishes itself, not alone thru transudation of serum, but also thru the repletion of the choroidal erectile system, which fills with blood and becomes turgescient. Should the vessels of the choroid have become friable thru sclerosis we may even get hemorrhages, (the explosive hemorrhages occurring during cataract extractions). This distension of the choroid is governed in part by a reflex vasodilatation,

but to this action of the sympathetic is added a passive dilatation due to the sudden fall of pressure caused by the evacuation of the fluid, and it is, therefore, the decompression which is the principal factor.

So far, in speaking of the influence of the general and of the local circulation on the ocular tension, no mention has been made of the effects of the experiments on the composition of the aqueous humor.

The methods of increasing blood pressure and ocular tension by manipulations at a distance, such as compression of the abdominal aorta, section of the pneumogastric, constriction of the neck, have already been mentioned. The results of these measures on the aqueous are quite variable. Section of the pneumogastric rarely changes the albumin content, (once in four times, Wessely); nor does compression of the aorta or constriction of the neck. This is explained by the slight rise in ocular tension, which rarely rises more than 6 or 7 mm. Hg. above the initial tension; so that the consequent intraocular vasodilatation and transudation of serum is inconspicuous. As already explained this resistance of the eye to an elevation of the cephalic blood pressure is due to the counter action of the sympathetic regulating system situated in the eye itself.

The intraocular tension may be indirectly increased by the section of the cervical sympathetic, which, according to Lodato, Mastrobuono and others, entails a notable increase in the amount of albumin. If we inject at the same time fluorescein into the veins of the animal, we shall find the coloring matter appear sooner on the operated side. This led Shöler and Uhthoff to the conclusion that the secretion was accelerated by the operation. It was, in reality, a question of intraocular vasodilatation.

One might, however, argue that certain experimenters have found a modification of the aqueous; and that in cases where it should not have manifested itself, for instance, after section or irritation of the cervical sympathetic

(or of the superior ganglion). The reader is asked to recall what has been said when on the subject of interventions on the sympathetic. He will remember that irritation of the nerve lowers the ocular tension in all animals; but that preceding the drop in the dog and the cat there is a preliminary sharp rise. This rise is due to the marked exophthalmus resulting from the irritation of the nerve; which, in turn is due to the orbital venous stasis, thus explaining the discrepancy between the results obtained by Lodato, Scalinci and others.

If before lowering the intraocular tension by faradisation of the sympathetic, we allow the aqueous to escape, we shall notice that the anterior chamber is very slow in refilling, and that it contains a fluid almost identical with the normal aqueous. In other words, we have obtained with electric irritation the same effect as that which we obtained by injecting adrenalin. This organic product influences the organic elements. The part of the blood pressure in the regeneration of the aqueous after ligation of a carotid shows itself by the slower refilling of the chamber, on the side on which the carotid has been ligated.

Measures applied to the globe itself are numerous, and bring about much more energetic changes in the ocular tension than the indirect methods. Thus we have seen that subconjunctival injections of a 10 per cent solution of NaCl. can cause a rise of 40 to 70 mm. Hg. While this rise in tension is taking place there is also a change in the aqueous, which reaches an albumin content of 0.9 to 1.0 per cent (normal 0.02 to 0.03).

A graphic chart of both values shows a surprising parallelism between the two. The rise is equally sharp, and almost synchronous. The drop, however, is much slower for the albumin, which is present some time after the tension has returned to normal. With the albumin the antibodies make their appearance. If an injection of fluorescein or uranin is made before the subconjunctival injection the passage of the coloring matter into the chamber



is so much accelerated and is much more intense on the irritated side.

Thus we find that the rise in tonus, the qualitative changes of the aqueous, and the appearance of the fluorescein show a remarkable parallelism, and there is no doubt that all these processes are set in play by the dilatation of the vessels of the uvea. They can all be slowed down, or prevented, by any measure which will cause anemia of the globe, such as faradisation of the sympathetic, intravenous injection of adrenalin, ligating the carotid of the same side, etc. It seems illogical to attribute the ocular hypertension to the increase in albuminoid substances in the aqueous; the proteid substances are present in virtue of a transudation of serum thru the dilated capillaries.

In an organ possessing an erectile tissue such as the eye possesses, it is not surprising that massage produces a certain lowering of the tension. The deviations are small, Knapp obtaining differences of 3 to 10 mm. Hg. only. The return to normal is very rapid, and qualitative changes are not noted. This same mechanism might be at the bottom of the changes noted with the tonometer of Schiötz by P. van Gelder. The repeated application of the instrument at intervals of 3 or 5 seconds has given figures inferior to the first ones. It is unnecessary to invoke an "active filtration of the aqueous humor" in explanation.

Numerous attempts have been made to secure artificially a lasting rise in the ocular tension. An excellent way, as already shown, is to induce choroidal stasis by supressing the anterior and posterior ciliary veins. In the dog the ligature of the anterior ciliary veins will even be attended with a rapid disorganization of the globe. Ligature of the vorticoses veins will give rise to a marked stasis, with displacement of the ciliary region, the iris, and the crystalline lens.

These methods give rise to a hypertension by passive filling of the vessels above the point of constriction. There are other methods which give rise to an active vasodilatation by irritation of the nerve, such as strongly hypertonic

saline injections, sublimate, sodium citrat, sodium fluorid, etc. Add to these such procedures as cauterization of the limbus. Whereas purely conjunctival inflammations and those affecting the episclera only superficially do not lead to an increase of tension, and the conjunctival vasodilatation is accompanied by a slight decrease of tension; anything acting on the cornea, and especially on the limbus, is accompanied by a rise in tension, either thru reflex, or thru a mechanical impediment to the anterior venous circulation. On the other hand, we often see contusions of the eye with small iridic hemorrhages showing a decrease of tension, in spite of the presence of blood in the anterior chamber. This is accounted for by the reflex vasoconstriction due to shock. Other contusions of the eye may set in play the ocular vasodilating reflex, but the rise in tension escapes unless it is considerable. In these cases, also, we have hemorrhages from the iris and ciliary body; which are of importance as noted in a number of clinical cases.

The composition of the aqueous humor is a far more sensitive test. Often, were we allowed to withdraw it, we would find albumin in the aqueous. Even after repeated instillations of distilled water we find this proteid in the aqueous. Misled by the theories of Leber as to the outlets for the aqueous and the consequences of their obstruction, certain experimenters have been led into adventurous procedures, such as injecting paraffin, electrolytic iron, negrosin, oil of Scarlach, etc., into the anterior chamber. Only in rare instances could the disappearance of the canal of Schlemm, or the effacement of the iridocorneal angle be determined; as could easily have been prophesied, the microscope showed profound lesions of the iris and choroid.

Osmotic processes may be used to vary the ocular tension. In 1913 Hertel showed that a strong hypotonus followed the feeding to a rabbit, or the injecting into its veins, of large quantities of salt or sugar. The tension returns to normal when the water withdrawn from the ocular tissues has been restored; and this return to the normal

may be hastened by replacing the concentrated salt solution by a hypotonic solution.

If the greater or less repletion of the uveal tissue is the only thing which regulates ocular tension, how about the hypotension in cases of irido-cyclitis and detachment of the retina? So far no mention has been made of pathologic conditions; as there is a wide breach between experiments made on healthy tissues, and clinical observations on diseased tissues. It stands to reason that a vascular system which is more or less destroyed by an acute or chronic inflammation is not capable of proper function. This becomes more apparent when we reflect that many diseases produce arterial obliterations with consequent lessened blood supply.

#### COLLYRIA AND PHYSIOLOGIC OCULAR TENSION.

Nothing is more obscure or debatable than the action of the alkaloids, and the various substances employed as collyria, on the ocular tension. The great clinical interest attached to them has made them the object of much study. For instance, why does atropin cause hypertonus, and eserin also in certain cases of glaucoma? The main difficulty lies in the uncertainty of the physiologists as to the point of attack of most of the drugs. Since the time of Brown-Sequard there has been a continuous discussion as to whether atropin acts on the terminal nerves or the muscular fibers; and the remarkable history of the antagonists does not shed any light on the controversy. The reasoning has been somewhat as follows: "An antagonist of atropin seems to exert its action on a well defined anatomic element; therefore, atropin acts on the same element. Or, atropin increases the action of some other alkaloid, which has an action similar to atropin, therefore both act on distinct elements. In many of these cases the conclusion is a *petitio principii*, inasmuch as the point of attack of atropin is still under discussion," (Nuel, Diction. de Phys. de Richet).

Animals act differently from man, and again differently according to species. For example: The instillation of

a 1 per cent solution of eserin into the conjunctival sac of a rabbit has a very insignificant action on the blood pressure. Whereas the effect on a cat is so great that this animal cannot be used in experiments on the ocular tension. The same is the case with atropin. Man is extremely susceptible to this alkaloid, the monkey, dog and cat much less; and still less the rabbit, guinea pig, and horse. Rabbits, goats, sheep and pigs eat belladonna leaves with impunity.

The investigations into the untoward action of certain collyria in pathologic hypertension have been without result, for the reason that we are unable to set up in animals affections similar to glaucoma in man. The hypertension which we can provoke has but a far-fetched relation to the real condition. It demonstrates certain mechanisms; but, as it is accidental and transitory, it can hardly serve as a basis for further researches on the action of the collyria. There are still to be considered the normal human eye and tonometric studies. But the action of the collyria on the normal eye is too weak to be measured with our clinical instruments which allow the taking of data at greater or less intervals only, whereas we should have a constant application of one hour at least with graphic registration. Notwithstanding, we shall see what has been done and said about the chief drugs used.

*Atropin.*—Experiments on the normal eyes of man and animals has led to three different opinions. Some hold that it induces a lowering of the ocular tension. Dor, experimenting on man, found a lowering of the tension in 20 per cent, a rise of tension in 3 per cent, and no effect in 16 per cent of his cases. He thought that the repeated instillation of atropin during several consecutive days resulted in a lowering of the tension which was more manifest if the other eye had been under the influence of eserin. Pflüger estimated the lowering of the tension in man at 80 per cent, and he found the same figure when experimenting with the manometer on the rabbit. Golovine, using the tonometer of Malakoff, found this

hypotension accompanied by a corneal lesion, and preceded by a slight hypertension. This hypotonising action was so generally admitted that von Graefe thought its use indicated in those corneal lesions attended by "edema of the parenchyma." Others, such as Laqueur, Weber, Stocker, etc., were of the opinion that atropin increases the ocular tension. Weber held that it had a different action on the vitreous than on the aqueous, an assertion which was sharply criticised by Schulten, and led to entoptic studies to prove that the vitreous was not influenced by either atropin or eserine. Others, again, such as Schiötz, Isakowitz, Langenhan, etc., think that atropin has no effect in the healthy eye. In view of this diversity of opinion it is rather difficult to give a satisfactory explanation of the hypertensor character of atropin in the glaucomas. The idea that it might have an influence by activating "the secretion" of the aqueous is controverted not alone by what has already been said, but also by the known fact that this alkaloid has the well known property of suspending the glandular secretions.

On the other hand, the ocular tension seeming to be under the primordial influence of the local circulation, it is interesting to determine the action of atropin on the blood vessels. Now, according to the dose, atropin diminishes and then suppresses the constricting action of the vasomotors. The normal tonus of the small vessels relaxes and the vessels dilate. Wegener is of the opinion, that as the capillaries do not offer any resistance, the blood passes into the larger canals and the tension falls. While this may be true for the blood pressure, is it also true for the ocular tension?

If we admit that the choroid is distended with blood its increase in size should logically increase the ocular tension, inasmuch as the "humors" of the globe are incompressible. But, the arterial pressure being low, the increase in volume of the erectile uveal tissue must be inconsiderable, and the choroid all the less distended in that it is held in check on the outer side by

the sclera, and on the inside by the pressure inherent in the vitreous and aqueous which lave the choroid. Thus we may understand the small effect of atropin on the healthy eye, in spite of its role of dilator inherent to its attack either on the vasomotor nerves, or on the contractile element itself. We must also keep account of the size of the doses used and of the sensibility of the organism on which we are experimenting. To account for the decided hypertonising effect in many cases of glaucoma we need but point to the vascular lesions, especially those of the veins; which, by impeding the return flow, bring on an increase of blood pressure all the greater proximally as the atropin paralysis of the arteries allows the choroid to assume a marked distension.

*Eserine.*—Like atropin and adrenalin a 1 per cent collyrium of eserine has a decided action on the pupil. That this is local is proved by the action taking place in an enucleated eye also. The action of eserine on the tension of the healthy globe is, however, but slight. In an eye with pathologic hypertension eserine will cause a drop in tension; altho there are many exceptions to this rule, the explanation for which was sought in experiments on animals and man. Man is particularly susceptible to eserine; then come dog and cat, with the rabbit bringing up the rear.

In man it was first held, following Laqueur, that the effect was nil. Later, the use of the tonometer of Schiötz having been popularized, many authors claimed that the tension, after a slight elevation, suffered a decline oscillating between 2 and 5 mm. Hg. This decline gave way to normal tension after 24 hours. Such was the opinion held by Pfäuger in 1882. Experiments on the cat do not seem to give the same results. A lowering of the tension of 5 to 10 mm. Hg. is produced by a few drops of eserine in 4 to 9 minutes, after which there is an increase in tension (Lewin and Guillery). Wessely holds that the cat is particularly responsive to eserine; he thinks that even in infrequent doses the diffusion thru the cat's organism is rapid, and brings on a low-



ering of the arterial pressure which vitiates the manometric tracings of the ocular tension.

On the rabbit, on the contrary, the results are uniform. Wessely has furnished us charts showing that the tension after an initial rise of ten to fifteen minutes after the instillation, immediately after the appearance of myosis, which reaches 15 to 17 mm. Hg. above the normal, drops gradually to reach the point of departure in an hour. It may even keep on dropping, which may be accounted for by the curarization, although the rapidity with which it drops would make it seem due to the action of the eserine. Keeping the proportions, and remembering that the tonometer does not possess the exactness of the manometer, we believe that we find the same behavior in the human eye.

Eserine is a vasoconstrictor, of which fact one can convince himself by watching with a loupe the contraction of the vessels in a hyperemic conjunctiva or a corneal pannus. This contraction lasts for about fifteen minutes, without being followed by a marked dilatation. The inspection of the deeper vessels is not easy. Wessely has noticed, not a constriction, but a dilatation of the vessels of the iris and ciliary body. He finds a striking similarity between the curves of the ocular tension after instilling eserine and those obtained after injecting solutions of NaCl. under the conjunctiva, and gives them both the designation of curves of "hyperemia of reaction."

Acting on the supposition that the eserine hypertension might be due to vasodilatation, he analyzed the aqueous and found a marked increase in its albumin content. He then injected fluorescein, to which the rabbit is highly susceptible, and found that on the eserinized eye the line of Ehrlich showed much more promptly than in the fellow eye. As both phenomena proved the passage of serum thru the vessels, he undertook to prove the opposite by diminishing the permeability of the vessels by injecting calcium salts,

which was followed by a diminution of the albumin content.

This leads us to the contemplation of the questions whether eserine has the same action on the human eye as on the eye of the rabbit; whether eserine acts differently on the external and on the internal vessels, and whether Weber was right in asserting that eserine caused a lowering of the pressure in the anterior chamber, and an elevation of pressure in the vitreous. We might repeat concerning eserine what has already been said about atropine as regards the point of attack. How does eserine determine a constriction of the pupil? Is the cramp due to its acting on the nonstriated muscle, or to a suspension of the sympathetic influence (the sympathetic is a dilator)? This problem might have a certain interest for the ophthalmotonus, inasmuch as the sympathetic system and the vasomotors are interdependent.

The sympathetic does not, however, seem to be paralyzed, for, even in the eyes of dogs and rabbits which have been strongly eserinized, the irritation of the cervical sympathetic will still show a reaction on the pupil. We can see the same thing if after dropping eserine in both eyes, we cut the sympathetic on one side, when we shall find the pupil narrower on the cut side. Even after animals have been slowly poisoned to death with calabar the sympathetic remains irritable. It is, therefore, probable that eserine acts on the muscular fiber. It produces a spasm of the sphincter, and, according to dose and circumstance, a spasm of the vessels. This will account for the hypotensor character which is now accorded it, which is not very prominent in the normal eye.

*Pilocarpin.*—Some authors hold with Rollet in denying pilocarpine all action on the tension of the normal eye. Others, with Heilbrunn, admit in man a slight rise, as was the case with eserine; the curve being more marked and more regular than it is with eserine. Pflüger and Golovin could find no relation between the variations of tension and the state of the pupil in their experiments on animals.

*Cocain.*—There are some authors, who, like Rollet, accord the role of hypertensor to cocain; instillation of a 2 per cent solution of the rabbit is supposed to produce a slight elevation of tension, it being undetermined whether this is followed by a decrease. On the other hand, renewed instillations cause hypotension thru corneal lesions (?). More recent experimenters, using the tonometer of Schiötz, have found in man after instilling a 3 per cent solution a hypotonic effect, some of 5 mm. Hg., others from 1 to 4. This is perfectly plausible if we reflect that the vasoconstricting effect of this alkaloid becomes the more marked the stronger the solution employed. This is why its use may delay the reestablishment of the anterior chamber after a cataract extraction, and give rise to prolapse of the cornea in persons whose vessels are modified by age. Fourière (1913) thinks that the action of cocain on the normal eye is variable, sometimes producing a light hypertension which is transitory, sometimes the opposite, sometimes having no effect whatsoever.

*Novocain* and *holocain* seem without influence on the ocular tension.

*Adrenalin.*—Rubert found that after instilling a fresh solution of 1 to 1,000 of adrenalin there was an initial hypotension, succeeded by a hypertension; which again gave way to a second and last hypotension. The results which differ from this seem to be due to differences in the drug used. Synthetic adrenalin has not the same effect as the natural product, the adrenalin of Hoechst giving just the opposite results. Adrenalin acts on the muscles which are innervated by the sympathetic.

*Dionin.*—This drug produces a nar-

rowing of the pupil of varying duration, which in most cases is followed by a dilatation. The myosis follows closely on the chemosis produced by the drug. The tension begins to rise after the instillation, reaches a point several degrees above, and, after returning to normal, sometimes drops below it (Toizyski).

It seems useless to continue with the enumeration of drugs the action of which on the ocular tension has been but vaguely determined. Without receding from our expressed opinion concerning the difficulty of interpreting the data of these experiments, we may profit from well known facts, and these are:

(a) The tension of the normal eye is but little influenced by collyria;

(b) The variations in tension are not dependent on the contraction or dilatation of the pupil;

(c) The action on the vessels seems to be the most important thing. Vaso-dilatation means a slight rise in pressure, vasoconstriction the opposite. This effect may be masked by the secondary action of the drug on the neighboring tissues and, particularly, on the nervous system. Not enough stress is laid on the size of the dose, the sensibility of the subject, and, most especially, on the patulence of the vessels at the moment of instillation.

In closing, it is of interest to note that nitrite of amyl, caffein, and antipyrin, taken by mouth, increase the ocular tension. The point is, that altho these drugs lessen the arterial blood pressure in other parts, they cause a dilatation of the cerebral blood vessels. Knowing the similarity existing between the innervation and the circulation in the brain and the eyeball these facts seem significant.

## SHORT ABSTRACTS.

Important points capable of brief presentation are here noticed. The systematic review of current literature is to be found in the Digest of the Literature.

**A. A. Gruenbaum.—Psychophysics of Optical Fatigue.**—*Tijdschr. v. Geneesk.*, January 27, 1917.

The method of the continual increase of the frequency of the flickering light allows a very accurate determination of the corresponding threshold values, that is the number of interruptions per second, when the flickering light just produces a constant impression. These threshold values are dependent on the degree of fatigue, which strong stimulation produces. If these threshold determinations are made during different times after fatigue the degree of fatigue and the gradually appearing restoration can be expressed in the curves of the increasing threshold values.

The course of these curves depends on the fatigue duration, and the intensity of the flickering light; and shows over compensation toward the return to the norm, with the direct fatigue of the exposed eye (distinguishing of the single light stimuli with higher frequency than in the norm). If one eye is examined, while the other one is exposed to the fatigue excitation, the curve shows the same curve, but without phenomena of supercompensation. Therefore a consensual fatigue of the eye exists and the reactions of the latter over compensation are characteristic for the restitution of the peripheric sensitive substances.

The comparison of the binocular and monocular fatigue leads to the conclusion, that binocular summation of the fatigue reactions does not exist.

E. E. B.

**Bichon.—Colloidal Sulphur in Rheumatic Ocular Disease.**—(*La Clinique Ophtalmologique*, July, 1917.) Arthritis combined with syphilis is one of the most frequent causes of inflammatory processes of the iris and sclera affecting often both eyes. It may come during or following the acute joint con-

dition. Up to the present the salicylates and aspirin have been used, but these drugs disturb the digestion and are too frequently followed by recurrences. Loeper obtained excellent results in rheumatic affections with colloidal sulphur. The method of choice is intravenous but they may be administered intramuscularly. Each ampule contains 2 cc. and is given every day or every second day. A series is ten to twelve injections. Five observations from the army are published in detail. In none of the cases has pain or any other symptoms followed the injections. A complete cure was effected in every case in a much shorter period than is necessary by the old time means.

J. S. W.

**Morax, V.—Parinaud's Conjunctivitis.**—(*Brit. Jour. Ophth.*, March, 1918.) The writer gives a brief account of researches made at the Lariboisière Hospital which, although they have not explained the nature of the infective agent in Parinaud's conjunctivitis, prove that this disease and tuberculous conjunctivitis, so often confused, are distinct morbid entities and in no way related to one another.

Incidentally he shows that Goldzieher was not the first to describe Parinaud's conjunctivitis; the case published in 1882 and two others reported in 1893, though they had a few clinical features in common, were shown by the histologic examination to be examples of the follicular form of tuberculous conjunctivitis without ulceration, since giant cells were demonstrated in the middle of the infiltrated nodules; this finding sufficiently differentiated even though inoculations on guinea-pigs were omitted.

Parinaud was well acquainted with tuberculous conjunctivitis, and never failed to have inoculations made when-



ever he suspected the tuberculous nature of a lesion. In a series of cases published by his former pupils, inoculations on guinea-pigs with a piece of conjunctival tissue, or of pus derived from infected glands, gave negative results, and the histologic examination of the conjunctiva never revealed the presence of giant cells; whereas in tuberculous conjunctivitis the presence of these structures was constant. And so also was the positive result obtained by inoculations on guinea-pigs with a piece of the conjunctiva or with pus, either subcutaneously or intra-peritoneally. A differential diagnosis between Parinaud's conjunctivitis and tuberculous conjunctivitis, by their clinical features alone, is often a delicate procedure. The error is much the more common as it is customary to say that tuberculous conjunctivitis is always accompanied by ulcerations. Cases, however, where we fail to notice any ulceration are by no means exceptional, and these are precisely the cases that are mistaken for Parinaud's conjunctivitis.

It is always easy to cut out a small piece of the conjunctiva, half of which is used for inoculation and culture, and the remaining half for histologic examination. If the histologic examination shows giant cells, we have to deal either with a case of tuberculosis or with one of sporotrichosis. In the first case inoculation will clear up the diagnosis, and in the second, a culture on usual media will show the typical cultural characters of the fungus. If the slide does not show giant cells, the differential diagnosis will have to be made between Parinaud's conjunctivitis and specific disease. In such a case experimental inoculation will prove negative. Microscopic examination may or may not show the spirocheta pallida, and even in cases of undoubted syphilis, we

must say, it is not always possible to find the infective organism.

Morax points out that up to now we have not been able to discover the infective agent of Parinaud's disease—but this is unfortunately true of a number of other diseases. We must admit that the clinical features by themselves are not always sufficient to clear up differential diagnosis, and we should rather trust the experimental or histologic examination whether we meet with a conjunctival affection with involvement of the lymphatic glands. The diagnosis of Parinaud's conjunctivitis should be reserved for those cases where the absence of giant cells, and the negative result of inoculation and culture would justify the elimination of tuberculosis, sporotrichosis, etc., of the conjunctiva.

C. H. M.

**Fernandez de Castro.**—**Parinaud's Conjunctivitis, Tuberculosis of the Conjunctiva.** (Bull. de la Soc. de Oft. de Buenos Aires, v. 4, p. 80.)

History of a case of Parinaud's conjunctivitis with red and yellow granulations and ulcers in both lids, accompanied by swelling of the parotid and preauricular glands. The frotis of the discharge and the inoculation of a piece of conjunctiva under the cellular tissue of the abdomen of a guinea-pig proved negative. Pus from the preauricular gland was sterile. However, histologic examination of a piece of conjunctiva near one ulcer showed zones of necrosis and cells of Langhans, indicative of tubercular infection. Von Pirquet reaction was strongly positive.

A new inoculation of conjunctiva under the skin in a guinea-pig produced caseous glands in the groin.

The author considers his case one of undoubted tubercular origin.

U. T.

# American Journal of Ophthalmology

Series 3, Vol. 1, No. 8

August, 1918

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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## OCULAR LESIONS FROM FILARIA AND ALLIED PARASITES.

The round worm and thread worm have been known as intestinal parasites for many centuries; and the *Filaria Loa*, as a parasite infecting the eye, since 1778. Yet apparently this class of Nematoda or round worms, constitute one of the most promising fields for investigation. Many isolated observations have been made, but uncertainty and confusion still prevail with regard to all but a few specific forms. Even the latest contribution to the subject, that of Pacheco Luna, (p. 122), while extending the range of interesting facts regarding filariasis, cannot be said to make our knowledge more certain, or to bring much advance in it in the direction of order.

A parasitic disease comes to be well understood only when its cause is known. The discovery of a causative organism, life history and habitat, has revolutionized our knowledge of every disease for which this has been accomplished; not only our theory of it; but equally its diagnosis and treatment. This has been as true of diseases studied for thousands of years, like

Malaria and Tuberculosis, as it has of Blastomycosis or Infective Jaundice. Even from the standpoint of the practicing physician, the exact description of the cause of a disease will outweigh in value the most elaborate clinical reports or refinements of diagnosis.

This is particularly applicable to our knowledge of filarial disease, with regard to which there has been a large accumulation of incomplete accounts, that throw but little real light upon the subject. Ward classes as "*Agamofilaria*," sexually immature, a large number of reported cases in which the incompleteness of the description, or the immaturity of the specimens, makes it impossible to determine the species to which they belong. Serious confusion has arisen both with regard to the species that affect the eye, and the regions in which they are endemic.

*The Filaria Loa*, recorded 140 years ago as infecting the eye, is the best known of these parasites. The first six cases were reported from the West Indies and from the Northern Coast of South America; and five of the six were in negroes who had been imported from the West Coast of Africa.

Ward points out that no case has been reported from the West Indies since 1845. It may be assumed that this disappearance of the disease was connected with the suppression of the African slave trade. The subsequent cases reported from America, beginning with that reported by Wilson to the American Ophthalmological Society in 1890, have occurred in persons who had resided in Africa, especially in the region of the Congo, mostly as missionaries. It can now be regarded as settled that this parasite enters its host only in West Africa. But, living in the tissues for many years, it is liable to be carried to any part of the world; where, however, it does not find the conditions necessary for its transmission.

These worms are nearly always multiple. At autopsy many have been discovered in the superficial connective tissue, with none in the head or region of the eye. As a rule, only the immature forms are found in the region of the eye, the fully developed worm showing little tendency to migrate. The former may move rapidly under the conjunctiva or the thin skin of the lids; but their presence here is quite unusual and erratic. They are more frequently felt in other parts, but much of the time give rise to no sensation whatever.

The presence of a worm about the eye may cause a stinging, pricking, or boring sensation, or the feeling of a foreign body; with conjunctival redness which quickly subsides when the parasite moves elsewhere. In other parts it may cause some soreness or tenderness. Or there may be swelling localized or diffuse; which may look like cellulitis, but usually disappears in a day or two. When visible in or near the eye, the removal of the worm has not been difficult, and it has been killed by an injection of mercuric chlorid.

*Filaria bancrofti* is widely distributed in tropical regions. In Samoa 60 per cent of the inhabitants show marks of the disease and probably all the natives are infected sometime during life. The

larval form, infesting the blood at night, was given the name *Microfilaria nocturna*; in contradistinction to *Microfilaria diurna*, the larva of the *Filaria Loa*, found in the blood by day. Filariar elephantiasis, caused by blocking of the lymph channels has long been known. Such blocking of lymph channels if temporary may cause edema of the lids; and recurring attacks may result in a condition resembling blepharo chalasis. Pterygium is extremely common in Samoa, and A. Leber has demonstrated filaria in these growths. He also observed evidences of obstruction of the circulation in the choroid and retina by miliary thrombi, causing hemorrhages and areas of degeneration.

Numerous cases of what were supposed to be other forms of filarial disease have been described. But probably most of them were due to forms of filaria that usually infest the eyes of the lower animals, and have accidentally gained admission to a human host. The large number of species already known to infest the lower animals gives some idea of the wide extent of this field. On the other hand the Guinea worm, *Dracunculus mediensis*, has been supposed to cause ocular lesions, because it was confused with the *Filaria Loa*. An instance of an allied form, commonly belonging in the eyes of other animals, is that of a species recently reported from China, as found both in human eyes and those of a dog. The specimens were regarded by Houghton as similar to those previously described under different names, *Filaria palpebraris*, of Wilson; and found in horses and cattle in Europe and India.

The cases in which filaria were actually found within the eyeball, in the anterior chamber by Barkan, and in the cataractous lens by the elder Graefe and Geschiedt, all belong in the category of unknown species. All seem to have arisen outside the tropical habitat of the *loa* and *bancrofti*. The description of a supposed filarial disease affecting the conjunctiva in children in Mexico and Central America, by Eisen, varies widely from most descriptions of filarial disease, and is not definite as regards the



organism. The clinical conditions to which attention is called by Pacheco Luna might readily be assigned to the *bancrofti* or some closely related form. In future much of the uncertainty of this subject can be avoided if the worms found are in each case sent to some expert zoologist. Ward points out that they can be permanently preserved by placing in 70 to 85 per cent alcohol, to which has been added 5 or 10 per cent of glycerin.

In the same order with the filaria—the Nematoda or true worms—belong the Ascaroidea. One of these, the round worm of the horse, *Ascaris megalcephala*, often examined in laboratories, produces extremely unpleasant and disabling symptoms in workers who are susceptible to it. These include irritation of the conjunctiva, with itching of the lids and caruncles that induce rubbing, which brings on severe swelling of the parts. It would seem that extreme susceptibility to this irritant may account for those cases of conjunctivitis which arise from being near horses. Dorff has experimented with regard to the irritant effects of the *ascaris*, and finds that they are exerted on the walls of the blood vessels, and are neutralized by adrenalin.

Among the nematode worms we also find the hookworms. *Ancylostoma duodenale* and *Necator americanus*. The eye symptoms that accompany hookworm disease have been regarded as due to the anemia; but there is evidence that they are directly connected with the toxins of the worm. Bietti reported amblyopia and central scotoma in hookworm disease, and Inouye, a case of retrobulbar neuritis, cured in ten days by thymol treatment. Calhoun regards the cataract as connected with the toxemia.

The ocular lesions produced by nematode worms offer a great field for accurate scientific observation. This is established by the many suggestive papers already to be found in the literature. More exact detailed descriptions, both of symptoms and parasites, with laboratory studies of the organisms and their products, will bring rich returns for the labor expended.

E. J.

## BOOK NOTICES.

**Atlas d'Ophthalmoscopie de Guerre,** par **Le Professeur Felix Lagrange** de Bordeaux. Large 8vo, pages 255, with 100 plates, 20 in colors, and 12 diagrams in the text. Paris, Masson et Cie, 1918. Price, \$9.00.

This atlas of war ophthalmoscopy is a striking evidence of scientific activity and achievement under adverse conditions. The whole of the text is printed in both French and English. The diagrams serve to indicate the path of the projectile causing the lesions, and each of them is printed in connection with both the French and the English text. The primary purpose of the work is to present by means of the plates, the ophthalmoscopic appearances caused by the various war injuries. But the explanations of the exact nature of the wound, the injuries to other parts that occurred in connection therewith, the symptoms arising therefrom, and the probable character of the changes that cause these appearances, add very greatly to the interest and value of the plates.

In the first 55 pages of text, the author analyzes the leading features of these injuries for the purpose of classifying them, and bringing out certain general laws and facts relating to them. He arranges them in six groups as follows:

I. Lesions of the inner coats of the eye caused by concussion from a distance, the force reaching the eye wholly thru the air.

II. Lesions of the optic canal by injuries of the frontal region and radiating fractures of the vault of the orbit.

III. Macular and paramacular lesions, from general concussions of the bones of the face, the injury not directly involving the orbital cavity.

IV. Lesions produced by projectiles acting on the bones of the face and fracturing the orbit. These include macular and paramacular lesions thru concussion, and peripheral fundus lesions due to contact of extraocular tissues.

V. Lesions of the deeper coats by projectiles involving the orbit behind the eyeball, but without touching it.

VI. Lesions of the internal coats of the eyeball by mediate or immediate contusions of the eyeball.

With reference to each of the above groups, Lagrange deduces from his observations certain laws:

I. The commotion produced in the air by the explosion of a shell at a distance may cause laceration of the uveal tract, luxation or subluxation of the lens or traumatic cataract. The chorioretinal lesions are here emphasized because it has been disputed that they could occur from this cause. Five such injuries with hemorrhages, choroidal ruptures, and later pigmentations about the posterior pole of the eye are here represented. Macular and paramacular lesions predominate, but sometimes extend to other parts.

II. Lesions extending into the optic canal cause optic atrophy. Many of these cases have been seen, but they are generally well understood and only two are published. Other nerves in and about the orbit, both sensory and motor are often involved.

III. Eyes that appear uninjured have suffered from injuries to the bones of the face thru a transmitted vibratory concussion. Lagrange compares this to the shaking of a ship by the waves beneath it. The adipose tissue of the orbit is almost fluid at the body temperature. The predilection of such lesions for the macula is explained by the supposition that this region is the most delicate, and by the resistance to ocular displacements afforded by the optic nerve. Lesions arising in this way, but causing no changes visible to the ophthalmoscope may produce the loss of central vision. Individuals thus affected must not be regarded as malingersers.

IV. Violence, causing a thrusting in of the orbital wall, causes more extensive injuries. Along with macular lesions, which are explained as those of the preceding groups, occur lacerations of the choroid, or more often of both choroid and retina toward the periphery of the fundus, and fronting

the point of fracture in the orbital wall. These lesions may be due to actual contact of the bone with the sclera, but they are also caused by a wave movement of the intermediate soft tissues. This ruptures the choroid, which bleeds; and the blood lifts and detaches the retina, which it may in turn rupture. From such an injury there follows a proliferating chorioretinitis.

V. When the missile passes thru the orbit without touching the eyeball, it may produce lesions like those just described, and in addition do great damage to the various structures in the orbit. If it strikes the optic nerve, this is likely to be more or less completely torn loose from its scleral attachments, giving rise to the ophthalmoscopic appearances of evulsion of the optic nerve. Three of the plates show such effects.

VI. When the projectile actually touches the sclera, the most severe injuries are produced. Cases of actual destruction of the eyeball by rupture of the sclera are not here considered; but short of this both choroid and retina may be lacerated by the force of the injury. The point of contact is the center of most severe injury; and from this region lesions radiate more or less extensively to other parts of the eye. Such extensions may involve the macula; but it is not often independently affected.

The lesions studied with the ophthalmoscope are discussed under the heads: Lesions of the optic nerve; Lesions of the Choroid; Traumatic Lesions of the Retina; and Traumatic Proliferating Chorioretinitis.

The injuries of the optic nerve may occur in the intraocular portion, in the retrobulbar part containing the blood vessels, or in the part extending from where the vessels enter the nerve to the optic foramen. The evulsion of the nerve causes hemorrhage and a deep pit. But the former is absorbed and the latter fills up with proliferating connective tissue. Injuries involving the retinal vessels often give rise to the appearances of ischemia of the retina; yet this part of the nerve may be quite seriously damaged without the vessels



being much affected. With regard to hemorrhage into the optic nerve sheath, Lagrange has never observed a case in which such hemorrhage extended directly on to the optic disc, altho such cases have been recorded by other observers, his plate 23 might well represent a late stage of such a lesion. He suggests that the appearance of a pigment ring on the disc does not prove the previous extension of the hemorrhage to this part, since the pigment cells may have migrated there later.

Against the view that the choroid cannot be ruptured so long as the sclera resists the contusion, Lagrange brings forward a large experience.

More than a dozen of his plates illustrate just that accident. But in many cases in which the choroid is lacerated, the retina escapes, and in both these membranes the vessels are more likely to escape than the other tissues. The lesions produced by air concussion are generally choroidal; those of contact chorioretinal.

The clinical picture and appearances of traumatic proliferating chorioretinitis are the most valuable contribution this work makes to the literature of ophthalmology. The leading characteristics of this condition are brought out by the following comparative table:

COMPARATIVE TABLE SHOWING THE DIFFERENCE BETWEEN THE CLASSICAL PROLIFERATING RETINITIS AND TRAUMATIC PROLIFERATING RETINITIS.

Classical Proliferating Retinitis is produced by organization of the extravasated blood. It may exist without foregoing hemorrhage.

Membranes with numerous processes; appearance of a cobweb covering a large extension of the fundus.

Membranes translucent at certain points.

Protuberances ending freely in the vitreous.

Pedicles, polymorphous masses, irregular surface, marked prominence.

Is located in any part of the retina.

Foci of pigmentation rather frequent.

Is often complicated by retinal detachment produced by traction of bands.

Traumatic Proliferating Chorioretinitis is always consecutive to a hemorrhage and to a rupture of the inner membranes.

Fibrous patch of a more regular thickness.

Opaque everywhere.

Simple proximity to the vitreous.

Smooth and even surface without marked prominence.

Much more frequent in the macula, and disc and adjoining parts.

Foci of pigmentation very frequent.

Not accompanied by detachment following the proliferation; on the contrary this latter binds the retina to the choroid.

In the introduction the upper part of each page presents the French text and the lower part the English translation. The latter made by Dr. Menier, a pupil of Lagrange, shows evidence of imperfect mastery of English. Optic "canal" is rendered "optic channel" and "projectile" is translated "missile" when the use of the original words "canal" and "projectile" would better conform to the best English usage. How-

ever these defects do not seriously impair the value of the translation; and this arrangement of the two texts is very convenient for one who desires to improve his reading knowledge of French.

The explanations of the plates are printed on successive pages with the English translation facing the plate.

It is not unusual to find French works lacking in those essential con-



veniences, a table of contents and an index. This work is a glaring example of this defect. It has neither index, table of contents, nor page headings. This does not greatly matter if one sits down to read it thru from beginning to end. But if one desires to find or refer to some particular topic, it detracts greatly from the value of the work, not to have any key to what it contains.

On the whole this book is extremely valuable and welcome. The subject of ocular injuries can never be learned thru rules or generalized statements. The more cases one studies, the better fitted to deal with them he becomes, and these plates offer an opportunity to study certain things about a large series of closely related cases. E. J.

**The Animal Parasites of the Human Eye**, with Notes on Similar Organisms in Other Vertebrates, by **Henry B. Ward**. Large 8vo. 92 pages, with 20 illustrations. Chicago, Cleveland Press, 1918.

This book is a reprint of the article on "Parasites, Ocular," in volume XII of the American Encyclopedia of Ophthalmology, which we have already mentioned in a notice of that work (p. 455); but it is fully worthy of more extended consideration.

The number of animal parasites already known as causing ocular symptoms is large, while the probability is strong that more are to be discovered than are yet known. On the list of those of known important etiologic significance are such widely separated organisms as the malarial plasmodium, the spirochetes, the liver flukes, the filarias, the fly larvae, and the louse; and in each of the orders to which these belong are probably many others that await recognition. A systematic review of the subject by an expert biologist ought to be of the highest value in the recognition of the known organisms, and the placing in the proper class of others as they are encountered clinically. Even the organisms, the claims of which are still not established, like the trachoma bodies (chlamydozoa) are here discussed.

In the preparation of this treatise a large amount of historical material has been searched and some of its more serious errors corrected. The plate found in a sixteenth century book that was supposed to illustrate the extraction of the Guinea worm from the eye is here reproduced. It was originally published by Jean Linscot, but probably represents the custom in Ormus of putting out the eyes of possible claimants to the throne; while in another part of the picture is shown a man in the act of extracting a Guinea worm from his leg.

It is to be hoped that existence of this monograph will bring about an improvement in the literature of its subject in the direction of greater definiteness in the description of the animal parasite observed in connection with any case. If this can be identified positively with some known form that causes such symptoms this should be done with the aid of the characteristics here given. If this cannot be done or if the organism is believed to represent a new species, it should be submitted to a thoroughly qualified expert biologist. By careful treatment of the specimen this is possible from any part of the world. And any such expert will be only too glad to study a possible new claimant for recognition in the class of organisms to which he is devoting special attention. E. J.

## CORRESPONDENCE.

### LONDON LETTER.

#### The Oxford Congress.

The Oxford Ophthalmological Congress held its ninth annual meeting at Oxford on Thursday, July 11th, and Friday, July 12th, last.

As in former years members enjoyed the hospitality of Keble College, whilst the meeting proper was held in the Department of Human Anatomy kindly lent for the purpose by Professor Arthur Thomson.

The proceedings opened at 10 a. m. on Thursday with an address by the Master, Mr. Sydney Stephenson, on "The History of the Congress."

The subject chosen by the Council for the annual discussion was "Ophthalmology and the War," the breadth of the title being such as to allow of both civil as well as military points of interest being introduced.

Sir William Job Collins, K. C. V. O., M. P., who had been invited to become the Doyme Memorial Lecturer for the year, opened the discussion; and in his preliminary remarks paid a just and sympathetic tribute to the late Robert W. Doyme, founder of the Congress.

The address on the subject commanded the closest attention of the meeting and a full discussion followed in which the following took part: Lieut.-Col. R. H. Elliot, (London), Capt. E. H. E. Stack, R. A. M. C., T., Miss Marion Gilchrist, (Glasgow), Dr. T. Harrison Butler, (Leamington Spa), Capt. P. H. Adams, R. A. M. C., T., Capt. Percival J. Hay, R. A. M. C., T., Capt. Thomson Henderson, R. A. M. C., Mr. R. J. Coulter, (Newport, Mon.), Maj. A. C. Purchas, N. Z. M. C., Staff-Surg. Hanson, C. B. E., R. N. V. R., Capt. Whittington, R. A. M. C., Mr. J. Gray Clegg, (Manchester), Dr. George Young, (Colchester), and Mr. Bernard Cridland, (Wolverhampton).

At the conclusion of the discussion Sir William Collins was presented with the Doyme Memorial Medal.

A contribution by Lieut.-Col. R. H. Elliot on "Some Useful Devices in Operative and Other Work" concluded the proceedings of the first day.

On Friday, July 12th, Sir William Barrett, F. R. S., read a valuable paper accompanied by demonstrations and slides on "Entoptic Vision." Sir William Barrett's work is well known on this subject, one which has since the introduction of the ophthalmoscope been far too much neglected by ophthalmologists. But as presented by him to the Congress it is likely to be productive of valuable assistance to the practice of ophthalmology in the near future.

Col. Hanford McKee, C. M. G., C. A. M. C., followed with a paper entitled "Some Aspects of Military Ophthalmology," in which the conclusions of a wide ophthalmic experience, gained

during the war from its beginning, were given and which should be of value to the highest administrative authorities.

The morning session concluded with two papers by Capt. Percival J. Hay, R. A. M. C., on:

(a) "Implantation of cartilage after excision or evisceration of the eye."

(b) "Vulcanite casts as a support for prosthesis."

Both of these were illustrated by slides, photographs of operative results and radiograms.

In the afternoon cases were shown at the Eye Hospital by Capt. P. H. Adams, R. A. M. C., T., and Dr. Orr, after which a paper by Lieut.-Col. Elliot on "Herpes Zoster Ophthalmicus" was read, followed by another on "The Results of Cataract Operations," by Dr. T. Harrison Butler, both of which were discussed.

In the Scientific Museum, Sir William Barrett gave demonstrations with the entoptoscope and an optometer. Mr. Sydney Stephenson and Lieut.-Col. Elliot showed various microscopic sections. Capt. Thomson Henderson showed sections of monkeys' eyes with special reference to the origin of the pectinate ligament, and Capt. Adams showed sections of horses' eyes with reference to a hitherto unknown disease causing blindness.

Capt. T. Henderson showed photographs of gun-shot injuries of the eyes and orbital regions, and also of contracted sockets improved by a suture operation which he described.

Captain Stack showed a combined perimeter and scotometer together with useful novelties.

Mr. R. J. Coulter showed improved test-types.

In the Commercial Museum various novelties were on view.

The contributions to the Congress will appear in the Transactions of the Ophthalmological Society of the United Kingdom with which body the Congress is now affiliated.

The arrangements for the Congress were in the hands of the Master, Mr. Sydney Stephenson, and of the Honorary Secretary, Mr. A. Bernard Crid-

land, and were excellently carried out. About 40 members were present. The official dinner was dispensed with, on account of war conditions; but a general meeting of the members was held on Thursday evening when a number of important subjects were discussed.

R. H. ELLIOT.

## OPHTHALMIC EXAMINATIONS.

The American Board for Ophthalmic Examinations at a recent meeting held in New London, Connecticut, decided to hold its next examinations at the New York Eye and Ear Infirmary, New York, Friday, October 25. Dr. William H. Wilder, Chicago, was elected secretary of the board.

The examinations next October will be the fifth to be conducted by the board. This board is composed of representatives of the American Ophthalmological Society, the Section on Ophthalmology of the American Medical Association, and the Academy of Ophthalmology and Oto-Laryngology. By arrangement with the American College of Surgeons the board has become the Ophthalmic Credentials Committee of the College, and conducts the examinations of the ophthalmic candidates for Fellowship in the College. The examinations as stated in Bulletin No. 1 of the College are as follows:

In addition to the general requirements for admission to fellowship (except Article 9), the examinations in ophthalmology consist of, first, case records; second, written examinations; and, third, clinical laboratory and oral examinations, or so much thereof as may be judged necessary:

a. Candidates in ophthalmology are required to submit twenty-five complete case records in

accordance with Article 9. Ten of these records should be of cases of ocular diseases and defects of varied character, including errors of refraction or muscle balance; external ocular diseases or diseases of the uveal tract or retina, or of the optic nerve, or glaucoma. The reports should show especially the reasons for the diagnosis and for the operative treatment, and the technique of operations.

b. The written examination will test the candidate's knowledge of the underlying principles or science of ophthalmology, including anatomy, embryology, physiology, physiologic optics, pathology, relation of the eye to other organs and diseases of the body.

c. The oral examination will include:

The external examination of the eye.

Ophthalmoscopy: (Candidates are requested to bring their own ophthalmoscopes).

Measurements of errors of refraction.

Testing of the ocular movements and fields of vision.

Relations of ocular conditions to diseases of other parts of the body and their treatment.

Laboratory examination in histology, pathology, and bacteriology of the eye."

Further information may be had upon request from the American College of Surgeons, 25 East Washington Street, Chicago.

## TO FIX ROUND LENSES.

To the Editor:

Since writing the article for the July number of the JOURNAL about preventing the turning of round lenses it has been discovered that the drop of solder can be used in the Windsor frame either by removing the celluloid rim or without doing so, if the solder be applied by means of a copper wire used like a soldering iron.

Yours very truly,

DAVID W. WELLS.

Boston, Mass.



# NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building Denver, Colorado. As these columns go to press on the 30th of the month contributors should send in their items by the 25th. The following gentlemen have consented to supply the News Item Editor with the news from their respective sections: Dr. H. A. Beaudoux, St. Paul; Dr. V. A. Chapman, Milwaukee; Dr. A. E. Davis, New York City; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. George F. Keiper, La Fayette, Indiana; Dr. George H. Kress, Los Angeles; Dr. W. Holbrook Lowell, Boston; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. George M. Waldeck, Detroit. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered, as well as foreign countries. Volunteers are therefore needed and it is hoped that they will respond promptly to this call.

## DEATHS.

Professor Stephan Bernheimer, of Innsbruck, died recently.

Colonel Raymond C. Bolling died while on duty with our Aviation forces in France.

Arthur W. De Roaldes, New Orleans, aged 69, died at his home, June 13th.

Charles H. Williams, Boston, aged 67, died at his home in Cambridge, June 9th, from heart disease.

Edwin G. Cowperthwaite, Philadelphia, aged 44, died at his home, June 11th.

James J. Smith, of New Britain, Conn., aged 55, died at the Howard Hospital, May 23rd, from cerebral hemorrhage.

Dr. Francis Barraza, Adjunct Professor of Ophthalmology in Buenos Aires, is dead. His principal papers were: "Ocular Trauma Under the Medico-Legal Aspects," and "Etiology of Myopia." He devoted also a great deal of his time to chemistry.

Dr. J. Gonzales Castellanos of Valencia, Spain, passed away at the age of 85 years. He was a pioneer in fighting trachoma since 1850. In 1870 he founded a free clinical course of Ophthalmology in Valencia, the first in Spain of its kind. Afterwards he devoted himself to the study and treatment of lepers.

## PERSONAL.

Dr. J. W. Newman was recently reelected President of the Louisiana Commission for the Blind.

Dr. F. M. Fernandez has been awarded a prize of the Academy of Sciences of Havana for his essay "On the Etiology and Treatment of Strabismus."

Jos. D. Heitger, A. B., M. D., announces the removal of his offices from Bedford, Indiana, to the Atherton Bldg., 608 Fourth street, Louisville, Ky.

Dr. Cassius D. Wescott, of Chicago, who recently was obliged to undergo an opera-

tion, is recuperating rapidly, and expects to resume his practice in August.

Dr. A. H. Little, Portland, Maine, has received his commission as Captain, M. R. C., and has gone on active duty at Camp Devens, Massachusetts.

Dr. J. A. Spaulding, of Portland, carried thru to a most successful ending as President, the annual meeting of the Maine Medical Association in June, besides contributing two important papers for discussion. His annual address, "The Eyes in War," will appear in a subsequent number of this Journal.

Drs. H. H. Briggs, of Asheville, N. C., F. P. Calhoun, of Atlanta, Ga.; Dorland Smith, Bridgeport, Conn.; David N. Dennis, Erie, Pa.; D. F. Harbridge, Phoenix, Arizona; J. W. Jervay, Greenville, S. C.; Wm. F. Hardy, St. Louis, Mo.; W. E. Shahan, St. Louis, Mo., and Hunter H. McGuire, of Winchester, Va., have been elected to membership in the American Ophthalmological Society.

Dr. S. J. Beach, Augusta, Maine, is doing valuable work on the newly formed State Board of Health and in conjunction with the Association Committee on Conservation of Vision. Dr. Spaulding, of Portland, intends to introduce that invaluable topic into the Normal and High Schools of Maine, Educating the Teachers and Scholars by Means of Lantern Slides." It is interesting to note that this is the first instance so far advanced in which a Board of Health has gone into the propaganda of Conservation of Vision.

## SOCIETY NEWS.

A new Ophthalmological Society has been founded in Madrid. The proceedings are published in the April number of "Archivos de Oftalmologia Hispano-Americana."

Because of the fact that more than half of the membership of the Sioux Valley Eye and Ear Academy are in active army service, there was no meeting of the Academy at Omaha in July.

Before the Section on Ophthalmology of the Canadian Medical Association at its recent meeting in Hamilton, Ontario, May 29th to 31st, papers were read by Col. W. R. Parker, of Detroit, on "Treatment of Simple Glaucoma," which will appear later in the *AMERICAN JOURNAL OF OPHTHALMOLOGY*; by Dr. E. E. Blaauw, of Buffalo, on "A Rare Growth on the Cornea," presenting patient and microscopic slides, and by Dr. John Wheeler, of New York, on "Paralysis of Accommodation."

#### MILITARY NOTES.

Major George F. Suker, of Chicago, has been transferred from Camp Custer to Hoboken, N. J.

Captain Chas. W. Kollock, of Charleston, S. C., is in charge of the Physical Examining Unit for the Aviation Section of the Signal Corps at Charleston.

Additions to the Honor Roll from Indiana Ophthalmologists:

Charles J. Adams, Washington,  
C. N. Howard, Kokomo,  
J. W. Green, Warsaw,  
R. E. Swope, Rockville,  
Harry Boyd Snee, South Bend,  
A. E. Barber, South Bend,  
W. C. Dyer, Evansville,  
T. P. Goran, Richmond.

Dr. Sidney Walker, Jr., of Chicago, who was seriously wounded during a recent engagement on the western battle front, is at present in a hospital in the outskirts of Paris. He is reported as out of danger and able to get around.

Dr. James A. Smith, of Chicago, who received a Lieutenant's commission in the Medical Reserve Corps in June, has been ordered to report for duty at Fort Oglethorpe.

Dr. Henry C. Haden, of Galveston, Texas, is now in service at the Walter Reed General Hospital, Washington, D. C., with rank of Major.

The names of Lieut. C. A. Bahn, of New Orleans; Capt. D. C. Iles, of Lake Charles, La.; Capt. A. H. Little, of Portland, Me.; Capt. George E. Frothingham, of Detroit, should be added to the Honor List of Ophthalmologists now serving in the U. S. Army.

#### MISCELLANEOUS

Col. James Bordley at a recent meeting held at the U. S. Army General Hospital No. 7 at Evergreen, outlined a plan of far-reaching scope which will make Baltimore the center for the reeducation of all war blinded soldiers.

The new health law of Kentucky, recently enacted, included inspection of the eyes of school children among the duties to be imposed upon the county or district health officer who shall be appointed under that law.

The Eleventh Annual Report of the Massachusetts Commission for the Blind is full of interest. "For five years the Commission has been making studies in various cities of Massachusetts among children with seriously defective sight, and has been urging the creation of special classes in the public schools where the number of such handicapped boys and girls makes it possible. Three such classes are now in existence in Boston, one in Cambridge, one in Lynn and one in New Bedford. These classes have a total membership of 78." Thus far the Commission has dealt with 919 children with seriously defective vision. Every effort should be made to include all cities to establish one or more sight saving classes.

# OPHTHALMIC LITERATURE

Under this head continuing the "Index of Ophthalmology" heretofore published in **Ophthalmic Literature** will be found the subjects of all published papers received during the last month, that bear to an important extent upon ophthalmology. The subject is indicated rather than the exact title given by the author. Where the original title has been in a foreign language it is translated into English. The journal in which the paper is published will indicate the language of the original.

The names of the different journals are indicated by abbreviations which generally correspond to those used by the **Index Medicus**, the **Journal of the American Medical Association**, and the **British Journal of Ophthalmology**. We will from time to time publish the list of ophthalmic journals, with the abbreviations used for each. Often a single letter discriminates between journals published in different languages. Thus "Arch. of Ophth." refers to the Archives of Ophthalmology, published in English; "Arch. d'Opht.," indicates the French Archives d'Ophtalmologie; "Arch. de Oftal." refers to the Archivos de Oftalmologia Hispano-Americanos, while "Arch. di Ottal." indicates the Italian Archivio di Ottalmologia.

In this index of the literature the different subjects are grouped under appropriate heads; so that all papers bearing on the same, or closely related subjects, will be found in one group. The succession of the groups is the same from month to month, and identical with that of the Digest of the Literature. Where a paper clearly refers to two subjects that belong in different groups, it will be noticed in both groups.

Each reference begins with the name of the author in heavyface type. This is followed by the subject of his paper. Then in brackets a number with (ill.) indicates the number of illustrations, or a number with (pl.) the number of plates illustrating the article, (col. pl.) indicates colored plates. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that the paper was read before some society and gave rise to a discussion which is published with it.

The "repeated titles" may render accessible the essential part of a paper, the original of which could not be consulted. These give (in brackets) after the author's name the volume and page of this department of "Ophthalmic Literature" where the title of the paper will be found; and then the journal, volume, and page where the translation or abstract is published.

It is desired to notice every paper as soon as possible after it is published. Readers will confer a favor by sending titles they notice have been omitted, with journal and page of publication; and of their own papers, sending either a copy of the journal in which each appeared, or a reprint. These should be sent as soon as possible to 318 Majestic Building, Denver, Colorado.

## DIAGNOSIS.

**Beaumont, W. M.** Malingering in Relation to the Eye. London: W. Heinemann, 1917.

**Gumbiner, A.** Defective Vision, Pathologic Significance. New York Med. Jour., v. 107, p. 1214.

**Jellett, J. W. H.** Detection of Simulated Blindness. Med. Press, May 29, p. 413.

**Moxon, F. H.** Illuminated Test Types for Estimating Light Sense and Night Blindness. Roy. Soc. Med. Sec. on Ophth., June 12. Lancet, June 22, 1918, p. 874.

**Rasquin.** Evaluation of Visual Acuity from a Military Standpoint. (1 ill. Bibl.) Arch. Méd. Belges, May, 1918.

**Ring, G. O.** Variable Findings in Ocular X-ray Localization. (Dis.) Amer. Jour. Ophth., v. 1, p. 506.

**Trantas.** Detection of Unilateral Blindness. Short Abstract in Jour. Amer. Med. Assn., v. 71, p. 17.

## THERAPEUTICS.

**Jackson, E.** Proprietary Drug Names. Amer. Jour. Ophth., v. 1, p. 529.

**Minnie, van der, A.** Radiography of Lacrimal Apparatus with Thorium Oxide. Nederl. Tijdschr. v. Geneesk, 1918, p. 52. Ophthalmol-Lindemann. Jour. Amer. Med. Assn., v. 71, p. 59.

**Puckner, W. A.** Names of Synthetic Drugs. Amer. Jour. Ophth., v. 1, p. 536.

**Sollman, T.** Comparative Activity of Local Anesthetics on Cornea. Abst. New York Med. Jour., v. 108, p. 31.

**Stieglitz.** Procain and Novocain Identical. Amer. Jour. Ophth., v. 1, p. 536.

## OPERATIONS.

**Bane, W. C.** Irrigation of Anterior Chamber. (Dis.) Amer. Jour. Ophth., v. 1, p. 572.

**Haab, O.** Local Anesthesia for Operations on Eye. Correspbl. f. Schweizer Aertze, v. 48, p. 593. Abst. J. A. M. A., v. 71, p. 74.

**Maddox, E. E.** Close versus Distant Illumination for Operations. Amer. Jour. Ophth., v. 1, p. 526.

**Pagenstecher, A. H.** Optico-ciliary Neurotomy; Resection of Optic Nerve, etc. Arch. of Ophth., v. 47, p. 409.



## REFRACTION.

- Bardsley, P. C.** New Form of Bifocals for Myopes. Roy. Soc. Med. Sec. on Ophth., June 12. *Lancet*, June 22, 1918, p. 874.
- Landolt, E.** Refraction; Latent Accommodation. *Arch. de Oft. Hisp.-Amer.*, v. 18, p. 211.
- Pifer, J. D.** Plea for More Careful Refraction. *Southwest Jour. Med. and Surg.*, v. 26, p. 125.
- Wells, D. W.** To Prevent the Turning of Round Lenses. (2 ill.) *Amer. Jour. Ophth.*, v. 1, p. 469.

## OCULAR MOVEMENTS.

- Chapman, V. A.** Bárány Chair Tests and Flying Ability. *Jour. Amer. Med. Assn.*, v. 70, p. 1560.
- Damens, E.** Ocular Paralysis After Intraspinal Anesthesia. *Prenza Med. Argentina*, v. 4, p. 417. *Abst. Jour. Amer. Med. Assn.*, v. 71, p. 77.
- Descomps, J., Enziere, J., and Merle, P.** Convergence of Eyeballs after Shell Concussion. *Bull. de la Méd. des Hop.*, v. 42, p. 385. *Abst. Jour. Amer. Med. Assn.*, v. 71, p. 316.
- Dunn, J.** Some Phases of the Vestibular Nerve Problem. *Arch. of Ophth.*, v. 47, p. 354.
- Fernandez, F. M.** Reese's Operation for Squint. *Cron. Med. Quir. de la Habana*, v. 44, p. 158.
- Holmes, G.** Disturbances of Ocular Movements and Nystagmus in Brain Injuries. *Brain*, v. 40, p. 500.
- Hubbard, S. T.** Congenital Retraction Movements. (Dis.) *Arch. of Ophth.*, v. 47, p. 416.
- Lortat-Jacob and Hallez, G. L.** Oculomotor Paralysis from Concussion. *Bull. de la Soc. de Méd. d. Hopitaux*, v. 42, p. 311. *Abst. Jour. Amer. Med. Assn.*, v. 71, p. 73.
- Moran, T. J.** Traumatic 6th and 7th Nerve Paralysis (Optic Lesions). *Penn. Med. Jour.*, v. 21, p. 568.
- Rochat, G. F.** Quick Phase of Spontaneous Nystagmus. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 432.
- Taylor, J.** Variable paralysis of Ocular Muscles. *Abst. Amer. Jour. Ophth.*, v. 1, p. 504.
- Wheeler, J.** Paralysis of Divergence. *Arch. of Ophth.*, v. 47, p. 418.
- Zimmermann, C.** Concomitant Movements especially of Upper Eyelid with Suction. (Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 473.
- Repeated Titles. **Hoeve, van der, J.** (v. 1, p. 19) *Jour. Amer. Med. Assn.*, v. 71, p. 158.

## CONJUNCTIVA.

- Ayraud, G. E.** Primary Tuberculosis of Conjunctiva. *Internat. Clin.*, 28th Series, 1918, p. 209.

- Bloch, C. E.** Dystrophy and Xerophthalmia in Infants. *Ugeskrift for Laeger.*, v. 80, p. 815. *Abst. Jour. A. M. A.*, v. 71, p. 322.
- Cowley, R. H.** Treatment of Chronic Conjunctivitis. *Ky. Med. Jour.*, v. 16, p. 311.
- Cunningham, J. F., and Wharton, J.** Contagious Diseases of the Conjunctiva. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 503.
- Doyle, J. F.** Diagnosis and Treatment of Trachoma. *Ky. Med. Jour.*, v. 16, p. 238.
- Fuller, T. E.** Parinaud's Conjunctivitis. *Amer. Jour. Ophth.*, v. 1, p. 499.
- Hathaway, W.** Is Ophthalmia Neonatorum a Reportable Disease? *Med Rev. of Rev.*, v. 24, p. 385.
- Kershner, W. E.** Etiologic Factors of Acute Conjunctivitis at Camp Sherman. *Amer. Jour. Ophth.*, v. 1, p. 480.
- Larkin, B. J.** Trachoma Situation in Indianapolis. *Jour. Indiana State Med. Assn.*, v. 11, p. 265.
- McCaw, J. A.** Ophthalmia Nodosa. *Amer. Jour. Ophth.*, v. 1, p. 443.
- Netto, O. C.** Etiologic Factor in Trachoma. *Amer. Jour. Ophth.*, v. 1, p. 493.
- Samartino, G.** Provoked Conjunctivitis. *Quad. de Med. Leg.*, Milan, 1917, p. 299.
- Shumway, E. A.** Vernal Conjunctivitis Greatly Improved by Radium Treatment. *Amer. Jour. Ophth.*, v. 1, p. 507.
- Tenner, A. S.** Chancre of Palpebral Conjunctiva. *Arch. of Ophth.*, v. 1, p. 505.
- Turner, J. B.** Recurrent Pterygium. *Amer. Jour. of Ophth.*, v. 1, p. 505.
- Tyson, H. H.** Electric Ophthalmia with Chorioretinitis. *Arch. of Ophth.*, v. 1, p. 420.
- Walker, C. E.** Pterygium Operations. Results. *Amer. Jour. Ophth.*, v. 1, p. 443.

## CORNEA AND SCLERA.

- Bane, W. C.** Corneal Ulcer. *Amer. Jour. Ophth.*, v. 1, p. 445.
- Superficial Corneal Haze. *Amer. Jour. Ophth.*, v. 1, p. 445.
- Conant, E. F.** Corneal Ulcer. *Amer. Jour. Ophth.*, v. 1, p. 512.
- Cordero, J.** Serpentine Ulcer of Cornea. (3 ill.) *Arch. de Oft. Hisp.-Amer.*, v. 18, p. 227.
- Hansell, H. F.** Perforation of Cornea Persisting for Eight Months. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 509.
- Hoeve, van der, J.** Blue Sclerotics. *Abst. Amer. Jour. Ophth.*, v. 1, p. 431.
- Marconi.** Blue Scleras and Brittle Bones. *Abst. Jour. Amer. Med. Assn.*, v. 71, p. 319.
- Marklund, G.** Heredity of Megalocornea. *Finska läk-sällsk. handl.* Helsingfors, v. 59, p. 1606.
- Roxburgh, A.** Cyst of Cornea. *Roy. Soc. Med. Sec. on Ophth.*, June 12. *Lancet*, June 22, 1918, p. 874.

**Sollman, T.** Activity of Local Anesthetics on Cornea. *Abst. N. Y. Med. Jour.*, July 6, p. 37.

**Stilwill, H. R.** Tuberculous Scleritis. *Amer. Jour. Ophth.*, v. 1, p. 446 and 575.

**Tyrrell, F. A. C.** Mooren's Ulcer. *Roy. Soc. Med. Sec. on Ophth.*, June 12. *Lancet*, June 22, 1918, p. 874.

**Zentmayer, W.** Zonular Opacity of Cornea. *Amer. Jour. Ophth.*, v. 1, p. 510. Epithelial Dystrophy of Cornea. *Amer. Jour. Ophth.*, v. 1, p. 450.

#### ANTERIOR CHAMBER AND PUPIL.

**Brav, A.** Clinical Value of Pupillary Changes. *N. Y. Med. Jour.*, v. 108, p. 143.

**Curdy, R. J.** Action of Miotic Drugs on Eyes with Incomplete Sphincter Iridis. (Dis.) *Jour. Amer. Med. Assn.*, v. 70, p. 1992.

**Lutz, A.** Light Pupillary Reflex; Its Path and Its Abolition. (2 ill. Bibl.) *Arch. of Ophth.*, v. 47, p. 370.

#### UVEAL TRACT.

**Black, M.** Uveal Tuberculosis. *Amer. Jour. Ophth.*, v. 1, p. 446.

**Brown, E. V. L.** Focal Infection Cause of Keratitis and Iritis. *Intern. Clinics*, 2, 28th Series, 1918, p. 21.

**Byers, W. G.** Inflammations of the Uveal Tract of Systemic Origin. *Canadian Med. Assn.*, J1., v. 8, p. 593.

**Cullom, M. M.** Surgery as a Therapeutic Agency in Acute Iritis. *South. Med. Jour.*, v. 11, p. 522.

**Hepburn, N.** Old Choroidal Scar with Fibrous Band. *Roy. Soc. Med. Sec. on Ophth.*, June 12, 1918. *Lancet*, June 22, p. 874.

**Schwenk, P. N. K.** Cysts of Iris. *Amer. Jour. Ophth.*, v. 1, p. 504.

**Strickler, D. A.** Iridocyclitis. *Amer. Jour. Ophth.*, v. 1, p. 514.

**Thompson, G.** Herpes Zoster Affecting Ciliary Nerves. *Amer. Jour. Ophth.*, v. 1, p. 502.

**Uribe-Troncoso, M.** Chorioretinitis with Fixed Opacities in Vitreous. *Arch. of Ophth.*, v. 47, p. 414.

**Weve, H.** Etiology of Uveoparotid Fever. *Amer. Jour. Ophth.*, v. 1, p. 433.

**Zentmayer, W.** Essential Atrophy of Iris. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 510.

Repeated Titles. **Maxwell and Kiep.** (v. 1, p. 220). *Amer. Jour. Ophth.*, v. 1, p. 451.

#### SYMPATHETIC DISEASE.

**Gifford, S. R.** Blood Count in Diagnosis of Sympathetic Ophthalmia. (Bibl.) *Arch. of Ophth.*, v. 47, p. 327.

Repeated Titles. **Poulard.** (v. 1, p. 220) *Amer. Jour. Med. Sc.*, v. 156, p. 141.

#### GLAUCOMA.

**Collins, E. T.** Effect of Hypotony on Rabbits' Eyes. *Abst. Amer. Jour. Ophth.*, v. 1, p. 501.

**Elliot, R. H.** Histology of the Trephined Disc. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 502.

**Perez Bufill.** Sclerectomy (Foroni) for Glaucoma. (14 ill. Bibl.) *Arch. de Oftal. Hisp.-Amer.*, v. 18, p. 215.

**Parker, W. R.** Treatment of Simple Glaucoma. *New York Med. Jour.*, v. 108, p. 91.

#### CRYSTALLINE LENS.

**Allport, F.** Smith-Indian Intracapsular Operation for Cataract. *Wisconsin Med. Jour.*, v. 17, p. 66.

**Crigler, L. W.** Aphakia in Man 48 Years of Age. *Arch. of Ophth.*, v. 47, p. 421.

**Fernandez, J. Santos.** Congenital and Traumatic Cataract. *Cron. Med. Quir. de la Habana*, v. 44, p. 128.

**Gotti, V.** Cataract Operation. *Bull. d. Sc. Med. di Bologna*, 1917, p. 300.

**Herzig, A. J.** Organization of Lens Matter in the Capsule. *Arch. of Ophth.*, v. 47, p. 417.

**Houwer, A. W. M.** Operation for Lamellar Cataract. *Amer. Jour. Ophth.*, v. 1, p. 431.

**Holloway, T. B.** Blue Cataract. *Amer. Jour. Ophth.*, v. 1, p. 535.

**Levin, I., and Cohen, M.** Action of Radium on Cataract. *New York Med. Jour.*, v. 108, p. 4.

**Talmey, M.** Suggestions for Improving Cataract Operation. *Arch. of Ophth.*, v. 47, p. 425.

#### RETINA.

**Knapp, A.** Blindness from Ischemia of Retina. *Amer. Jour. Ophth.*, v. 1, p. 507.

**Koeppel, L.** Cause of Night Blindness. *Munch. med. Woch.*, April 9, 1918. *Abst. Med. Rec.*, July 6, 1918, p. 34.

**Lundsgaard, K. K.** Present Status of Hemeralopia. *Hospitalstidende*, v. 61, p. 470.

**Naville, F.** Amaurotic Family Idiocy. *Abst. Jour. Amer. Med. Assn.*, v. 71, p. 74.

**Parker, W. R.** Frequency of Cilioretinal Arteries in 3,554 Eyes. *Amer. Jour. Ophth.*, v. 1, p. 490.

**Rochat, G. F.** Late Detachment of Retina After Fall on Head. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 470.

**Sautter, A. C.** Opticociliary Vessel. *Amer. Jour. Ophth.*, v. 1, p. 509.

**Stenitzer, and Schröder, G. E.** Liver Substance in Treatment of Night Blindness. *Hospitalstidende*, v. 61, p. 481. *Short Abst. Jour. Amer. Med. Assn.*, v. 71, p. 78.

**Stilwill, H. R.** Hole in Macula. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 513.

**Talbot, F. B.** Amaurotic Family Idiocy. *Amer. Jour. Dis. Children*, v. 16, p. 39.

**White, J. W.** Obliterating Endarteritis. *Arch. of Ophth.*, v. 47, p. 415.

**Young, G.** Threshold Test. (4 ill.) *Brit. Jour. Ophth.*, v. 2, p. 384.

**Zentmayer, W.** Retinitis Proliferans. *Amer. Jour. Ophth.*, v. 1, p. 505.

## TOXIC AMBLYOPIAS.

- Haas, H. K. de.** Neuroretinitis from Arsenic. *Abst. Amer. Jour. Ophth.*, v. 1, p. 433.
- Macht, D., Isaac, S. and Greenberg.** Influence of Opiates and Antipyretics on Field of Vision. *Proc. Soc. Exp. Biol. and Med.*, v. 15, p. 46.

## OPTIC NERVE.

- Bell, G. H.** Bilateral Papilledema Due to Empyema of Sphenoid and Ethmoid. Operation, Recovery. *Arch. of Ophth.*, v. 47, p. 344.
- Brown, E. J.** Retrobulbar Neuritis following Influenza. *Amer. Jour. Ophth.*, v. 1, p. 498.
- Enroth.** Coloboma of Optic Nerve. *Finska läk.-sällsk. Handl. Helsingfors*, v. 59, p. 1499.
- Faith, T.** Retrobulbar Neuritis Due to Syphilis. *Amer. Jour. Ophth.*, v. 1, p. 439.
- Goldsmith, G. H.** Cystic Swelling of Disc. *Lancet*, June 22, 1918, p. 847.
- Hamilton, A. S., and Nixon, C. E.** Optic Atrophy and Multiple Peripheral Neuritis Developed in Manufacture of Explosives. *Jour. Amer. Med. Assn.*, v. 70, p. 2004.
- Paton, L.** Neuroretinitis with Chicken-pox. *Roy. Soc. Med. Sec. on Ophth.*, July 12, 1918. *Lancet*, June 22, p. 874.
- Price, G. E.** Optic Neuritis with Trophic Changes in Muscles, Joints and Nails. *Jour. Nerv. and Ment. Dis.*, v. 46, p. 128.
- Repeated Titles. *Marin* (v. 1, p. 463) *Amer. Jour. Ophth.*, v. 1, p. 450.

## VISUAL TRACTS AND CENTERS.

- Campbell, W.** Permanent Hemianopsia Following Migrain. *Amer. Jour. Ophth.*, v. 1, p. 447.
- Colored Hearing. *Abst. Med. Rec.*, v. 94, p. 71.
- Dercum, F. X.** Hemianopsia. *Phila. Neurol. Soc.*, March 27, 1918. *Abst. Med. Rec.*, v. 94, p. 88.
- Gordon, A.** Visual Hallucinations in Middle-aged Man. *Jour. Nerv. and Ment. Dis.*, v. 47, 1918.
- Holmes, G.** Disturbances of Vision by Cerebral Lesions. *Brit. Jour. Ophth.*, v. 2, p. 353.
- Jackson, E.** Neurobiotaxis. *Amer. Jour. Ophth.*, v. 1, p. 527.
- Kappers, C. U.** Phenomena of Neurobiotaxis in Visual Apparatus. *Amer. Jour. Ophth.*, v. 1, p. 518.
- Lloyd, J. H.** Sensory Aphasia with Right Homonymous Hemianopsia. *Med. and Surg.*, March, 1918.
- Roelofs.** Central Visual Acuity. *Amer. Jour. Ophth.*, v. 1, p. 430.
- Shaw, R. W.** Optical Illusions with Fatal Consequences. *Science*, v. 48, p. 45.

**Strebel.** Disturbance of Visual Fields. *Schweiz. Arch. f. Neurol. u. Psychiat.*, 1918, p. 173.

**Young, G.** Threshold Tests for Light and Color. *Lancet*, June 8, 1918, p. 842. *Amer. Jour. Ophth.*, v. 1, p. 503.

## COLOR VISION.

Dangerous and Harmless Color Blindness. *Jour. Amer. Med. Assn.*, v. 71, p. 164.

## EYEBALL.

- Sweet, W. M.** Enucleation Under Local Anesthesia. *Amer. Jour. Ophth.*, v. 1, p. 577.
- Uhlenhuth, E.** Influence of Function Upon Structure of Eye. *Arch. of Ophth.*, v. 47, p. 401.

## THE LACRIMAL APPARATUS.

**Bookwalter, C. F.** Intranasal Operation for Relief of Chronic Dacryocystitis. *Ann. Otol. Rhin. and Laryngol.*, v. 26, p. 982.

## LIDS.

- Blaskovics, L.** Operative Treatment of Traumatic Coloboma of Lid. (5 ill.) *Arch. of Ophth.*, v. 47, p. 354.
- Carreras, B.** Congenital Bilateral Blepharoptosis Operated on by Motais' Method. (3 ill.) *Arch. de Oftal., Hisp.-Amer.*, v. 18, p. 202.
- Coover, D. H.** Postoperative Congenital Ptosis. *Amer. Jour. Ophth.*, v. 1, p. 444.
- Del Monte.** Etiology and Pathogenesis of Chalazion. *Abst. Amer. Jour. Med. Sc.*, v. 156, p. 143.
- Gillies.** Blepharoplasty. *Amer. Jour. Ophth.*, v. 1, p. 503.
- Jackson, E.** Entropion of Lower Lid. *Amer. Jour. Ophth.*, v. 1, p. 514.

## ORBIT.

- Bell, G. H.** Pulsating Exophthalmos. *Arch. of Ophth.*, v. 47, p. 417.
- Garsonnin.** Ocular Prothesis. (1 ill.) *Chron. Méd.*, v. 24, p. 184.
- McKeown, E. E.** Exophthalmos Due to Ethmoidal Disease. *Amer. Jour. Ophth.*, v. 1, p. 514.
- Zeemann, W. P. C.** Varicocele of Orbit. *Nederl. Tijdschr. v. Geneesk.*, 1918, p. 986. *Abst. Jour. Amer. Med. Assn.*, v. 71, p. 236.

## PARASITES.

**Cabaut, J. A.** Filaria Loa. *Amer. Jour. Ophth.*, v. 1, p. 450.

## TUMORS.

- Brotherus, S.** Polypoid Tumor of Conjunctiva. *Finska läk.-sällsk. Handl. Helsingfors*, v. 59, p. 1599.
- Garcia Mansilla.** Exenteration of Orbit for Sarcoma of Conjunctiva. *Arch. de Oft., Hisp.-Amer.*, v. 18, p. 243.
- Nance, W. O.** Nonpigmented Intraocular Neoplasm in Adult. *Amer. Jour. Ophth.*, v. 1, p. 436.



**Posey, W. C.** Orbital Tumor. *Amer. Jour. Ophth.*, v. 1, pp. 505, 507.

**Schwenk, P. N. K.** Cysts of Iris. *Amer. Jour. Ophth.*, v. 1, p. 504.

### INJURIES.

**Bane, W. C.** Extraction of Steel from Vitreous. *Amer. Jour. Ophth.*, v. 1, p. 445.  
 Eye Injury. *Amer. Jour. Ophth.*, v. 1, p. 513.

**Heckel, E. B.** Whip Cracker Injury of Eye. (5 ill.) *Amer. Jour. Ophth.*, v. 1, p. 468.

**McKeown, E. E.** Eye Injury. *Amer. Jour. Ophth.*, v. 1, p. 515.

**Marbourg, E. M.** Wood Splinter in Orbit. *Amer. Jour. Ophth.*, v. 1, p. 515.

**Nance, W. O.** Severe Ocular Injury by Broken Spectacle Lens. *Amer. Jour. Ophth.*, v. 1, p. 434.

**Newton, L. A.** Early Care of Eye Injuries. *Jour. Oklahoma St. Med. Assn.*, v. 7, p. 177.

**Strickler, D. A.** Penetrating Eye Injury. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 512.

**Wieden, E.** Trauma of Eye. *Abst. Jour. Amer. Med. Assn.*, v. 70, p. 2059.

**Zwaluwenburg, J. G.** Certainty of Localization of Foreign Bodies in Eye. *Amer. Jour. Roentgen.*, v. 4, p. 512.

### PATHOLOGY.

**Howe, L.** Relation of Hereditary Eye Defects to Genetics and Eugenics. (Dis.) *Jour. Amer. Med. Assn.*, v. 70, p. 1994.

### GENERAL DISEASES.

**Holland, E. E.** Focal Infections of Mouth and Accessory Sinuses in Relation to Ophthalmic Inflammations. *Jour. Ind. State Med. Soc.*, v. 11, p. 274.

**Kinnier Wilson, S. A.** Ocular Lesions in Epidemic Encephalitis. (Ill.) *Lancet*, July 6, 1918, p. 7.

Laboratory Methods for Diagnosing Syphilis of the Eye. *Ky. Med. Jour.*, v. 16, p. 322.

**Langdon, H. M., and Jones, I. H.** Relation Between Ear and Eye as Shown by Bárány Tests. *Arch. of Ophth.*, v. 47, p. 348.

**Yealland, L. R.** Hysteric Disorders of Vision. *Lancet*, June 22, 1918, p. 874.

Repeated Titles. **Abadie.** (v. 1, p. 221) *Amer. Jour. Med. Sc.*, v. 156, p. 141.

### HYGIENE.

**Cruise, R. R.** Visor to Protect Eyes. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 502.

### OPHTHALMIC SOCIOLOGY AND HISTORY.

American Ophthalmological Society. *Amer. Jour. Ophth.*, v. 1, p. 453.

**Baudouin, M.** St. Jerome and Binoculars. (3 ill.) *Chron. Méd. Paris*, v. 24, p. 219.

**Bourgeois, A.** St. Jerome and Binoculars. (2 ill.) *Chron. Méd. Paris*, v. 24, p. 57.

**Carson, W. E.** Visual Requirements of the United States Navy. (2 ill.) *Jour. Amer. Med. Assn.*, v. 71, p. 263.

**Chance, B.** Examination of First Draft Men. (Dis.) *Amer. Jour. of Ophth.*, v. 1, p. 511.

**Chapman, V. A.** Indemnities Following Injuries to Eyes. How Shall We Determine Them? (4 ill.) *Wisconsin Med. Jour.*, v. 17, p. 54.

**Elliot, R. H.** The British Society Meeting. *Amer. Jour. Ophth.*, v. 1, p. 534.

**Gradle, H. S.** Computation of Compensation for Ocular Injuries. *Amer. Jour. Ophth.*, v. 1, p. 487.

**Greenwood, A.** Eyes of the Navy. *Jour. Amer. Med. Assn.*, v. 70, p. 2002.

**Jackson, E.** Our Journal Form. *Amer. Jour. Ophth.*, v. 1, p. 454.

The Western Meetings. *Amer. Jour. Ophth.*, v. 1, p. 528.

Defects in Education for Ophthalmic Practice. *Amer. Jour. Ophth.*, v. 1, p. 482.

Loss of Sight from Embolus, not Accidental. *Jour. Amer. Med. Assn.*, v. 71, p. 306.

No Blind, But Only Normal People Who Cannot See. *Lancet*, July 6, p. 30.

**Smith, J. J.** Eye, Ear, Nose and Throat Work at Recruiting Depot. *New York Med. Jour.*, v. 108, p. 69.

**Snell, A. C.** Visual Economics as Applied to Workmen's Compensation Law in New York. *N. Y. State Jour. Med.*, v. 18, p. 284.

**Vallon, M.** Training and After Care of Blinded in France. *Lancet*, June 22, 1918, p. 882.

**Wilder, W. H.** Visual Standards of United States Army. *Jour. Amer. Med. Assn.*, v. 71, p. 266.

### ABBREVIATIONS

The following are the abbreviations used in Ophthalmic Literature for the names of the journals most frequently referred to. The names of the principal ophthalmic journals now published are here included, with those of journals merged to form this journal; and of a few general medical journals which will illustrate the general plan of choosing such abbreviations. The same plan is followed when journal names are abbreviated in the bibliographies appended to original papers.

This list also indicates, in most instances, how often the journal is issued and the city of its publication, facts not given in the abbreviations. When any such abbreviation is used the volume and page are appended, thus v. 1 p. 387, or in a few cases the date of publication. It is manifestly impossible to give here abbreviations for all the many hundreds of general medical journals. The few appended must be regarded as samples of such abbreviations. It will be the endeavor of our compilers always to give enough of the journal name to

make it possible to identify the journal with certainty in the catalogue of any library, or any dealer through whom it might be obtained.

**Amer. Jour. Opth.** American Journal of Ophthalmology. Monthly, Chicago. In general this journal (series 3) is referred to. When, however, the number of the volume is higher than that of the current volume, the reference is to its predecessor, published in St. Louis. When there would otherwise be uncertainty, or if the first journal of this name is referred to, the year of publication will be appended.

**Ann. of Opth.** Annals of Ophthalmology. Quarterly, St. Louis.

**Anales de Oftal.** Anales de Oftalmologia. Monthly, Mexico.

**Ann. d'Oculist.** Annales d'oculistique. Monthly, Paris.

**Ann. di Ottal. e Clin Oculist.** Annali di Ottalmologia e Clinica Oculistica. Monthly, Rome.

**Arch. d'Ophtal.** Archives d'ophtalmologie. Monthly, Paris.

**Arch. of Opth.** Archives of Ophthalmology. Bi-monthly, New York City.

**Arch. f. Augenh.** Archiv für Augenheilkunde. Irregular, Wiesbaden.

**Arch. di Ottal.** Archivio di Ottalmologia. Irregular, Palermo.

**Arch. de Oftal. Hisp.-Amer.** Archivos de Oftalmologia Hispano-Americanos. Monthly, Barcelona.

**Brit. Jour. Opth.** British Journal of Ophthalmology. Monthly, London.

**Clin. Oculist.** La Clinique Oculistique. Monthly, Paris.

**Centralb. f. prakt. Augenh.** Centralblatt für praktische Augenheilkunde. Monthly, Leipzig.

**Graefe's Arch. f. Opth.** Archiv für Ophthalmologie. (Established by Albrecht von Graefe.) Irregular, Wiesbaden.

**Klin. M. f. Augenh.** Klinische Monatsblätter für Augenheilkunde. Monthly.

**Nippon Gank. Zasshi.** The Journal of Japanese Ophthalmologists. Monthly, Tokyo.

**O. L.** Ophthalmic Literature. Monthly, Denver.

**Opth. Rec.** Ophthalmic Record. Monthly, Chicago.

**Ophthalmol.** Ophthalmology. Quarterly, Seattle.

**O. Y. B. or Y. B.** Ophthalmic Year Book. Annual, Denver.

**Soc. Buenos Aires.** Boletín de la Sociedad de Oftalmología de Buenos Aires. Annual. Buenos Aires.

**Soc. franc. d' Opht.** Bulletins et mémoires de la Société française d'ophtalmologie. Annual, Paris.

**Trans. Amer. Opth. Soc.** Transactions of the American Ophthalmological Society. Annual, Philadelphia.

**Trans. Opth. Soc. U. K.** Transactions Ophthalmological Society of the United Kingdom. Annual, London.

**Vestnik Ophthalmol.** Vestnik Oftalmologii. Bi-monthly, Kiev.

**Woch. f. Therap. u. Hyg. d. Aug.** Wochenschrift für Therapie und Hygiene des Auges. Bi-weekly. Breslau.

#### GENERAL MEDICAL JOURNALS

**Amer. Jour. Med. Sc.** American Journal of the Medical Sciences. Monthly, Philadelphia.

**Boston Med. and Surg. Jour.** Boston Medical and Surgical Journal. Weekly, Boston.

**Brit. Med. Jour.** British Medical Journal. Weekly, London.

**Jour. A. M. A.** Journal of the American Medical Association. Weekly, Chicago.

**Lancet.** The Lancet. Weekly, London.

**Nederl. Tydschr. v. Geneesk.** Nederlandsch Tydschrift voor Geneeskunde. Weekly, Amsterdam.

# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 1

SEPTEMBER, 1918

No. 9

## THE TREATMENT OF BLOOD CYSTS OF THE ORBIT.

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A report of three cases of this condition, with discussion of its pathology and treatment. This is a paper presented to the Section on Ophthalmology of the American Medical Association, June 14th, 1918, and published here through the courtesy of the Journal of the American Medical Association.

The subject of blood cysts of the orbit is treated, if at all, in a very step-motherly way in all the classical works that I have consulted. Aside from the standard types of cyst, namely, dermoid, mucocele, cephalocele, and meningocele, other cysts of the orbit are either not mentioned at all, or in such a perfunctory way that the impression given is that the author has never seen anything of the kind. The treatment described is also either of the absent variety, or is so sketchy as to convey no impression of personal experience or conviction. On the other hand, I have seen three cases which indicate the importance of keeping such cysts within our purview, and of having some definite ideas as to the best method of treatment.

### REPORT OF CASES.

Case 1.—A boy aged 8 years, was brought to me in June, 1905. There was a history of his having fallen and struck the left eyebrow when two years old. The father thought that the left eye was a little larger than the right, but it gave the child no trouble until two days before he came to me, when it began to pain him and to protrude.

The right eye was found to be normal, and the left eye was pushed far forward and downward, the cornea being about 5 mm. farther forward than that of the right eye. The ophthalmoscope showed somewhat en-

larged veins, but no other abnormality. The vision was 20/20—. The boy felt sick and had considerable pain at times. He was put to bed and given full doses of potassium iodid with some apparent improvement. But after three weeks, as the exophthalmos was evidently increasing, the contents of the orbit were exposed by the Krönlein method, and a dark-colored tumor within the muscle funnel could be seen extending back toward the apex of the orbit. The tumor was nearly three-fourths of an inch in diameter and felt quite firm. But on my attempting to outline it with the finger, it suddenly collapsed and a large quantity of dark brownish fluid poured out of the wound. On cleaning this away, I could neither see nor feel the tumor. So I replaced the outer wall of the orbit and the wound healed without any reaction.

The pain ceased at once and the eyeball returned to a nearly normal position. Three months later the boy was brought back with the eyeball bulging nearly as badly as ever and the sight of the left side reduced to about 20/100. The outer wall of the orbit was again turned back, and when I opened the periosteum the tumor was plainly visible. This time before palpating it, I secured the tumor by passing a suture through its wall. It was again opened and a brownish fluid similar to that



seen at the previous operation was evacuated.

The cyst was multilocular, since, on my introducing my finger into the first cavity, one or two other cavities were broken into and evacuated. The cavity led along the optic nerve to the apex of the orbit. It was swabbed out, first with dry swabs, then with swabs dipped in 95 per cent phenol (carbolic acid), the latter being passed firmly down to the end of the cavity, and finally with swabs dipped in alcohol. The bone was then replaced, and although the patient had a temperature of 102 F. at the end of twenty-four hours, on the succeeding day the temperature became normal, and there was no further reaction.

The eyeball receded so as to be very little, if at all, more prominent than the right eyeball. There was a slight convergent strabismus, and the vision at the end of two weeks without the correction was 20/30—. When the patient was last heard from, about two years later, the condition was satisfactory.

Case 2.—R. G., a strong, healthy boy, aged 15, was brought to me April 3, 1917. There was no history of any injury. In January, 1916, the mother noticed that the left eye seemed a little larger than the right. This difference slowly but steadily increased; until, at the time of my first examination, the left eye was pushed forward about one-half inch farther than the right eye, with a somewhat limited motion inward.

The vision was 18/20+, and the fundus normal. There was no diplopia and no pain. The right eye was normal, the vision being 18/15. As an examination of the nose and a roentgenogram gave no clue to the cause of the exophthalmos, an exploratory incision through the outer half of the eyebrow was made and a firm but somewhat elastic tumor could be felt filling up the outer half of the orbit, extending to an undefined extent backward and inward.

I am bound to confess that in spite of my experience in the preceding case, the idea of the tumor being a blood

cyst did not occur to me and I gave a very guarded prognosis as to the possibility of my being able to remove the tumor without spoiling the eye. One week later I cut away enough of the outer wall of the orbit to expose the tumor plainly, and while I was passing a suture through the tumor to aid in removing it, a little dark brown fluid escaped, which led me to incise the tumor freely. It turned out to be a large cyst, made up of several pockets more or less completely separated and filled with a brownish fluid. These were broken up with the finger, and after firmly packing the cavity, which extended back to the apex of the orbit, I used phenol freely as in the preceding case, and finished by swabbing with alcohol.

A small drainage tube was left in the external wound for two or three days, but there was no reaction nor discharge. When the boy went home several weeks later, the vision was normal in each eye. The left eyeball was very slightly more prominent than the right, with movement inward and outward slightly restricted. There was a slight ptosis and diplopia on the patient's looking to the left. Three months later, the mother reported that the eye seemed to be getting a little large; Sept. 10, 1917, however, his home oculist, Dr. Vercoe of Lead, S. D., wrote me that the eye had receded to its normal position.

Case 3.—Mrs. W. P., aged 40, came to me, Oct., 1909, complaining that for three years she had been having pain in the right eyeball, which had been gradually getting larger than the left. The right eye was protruded at least a half inch farther forward than the left, and there was moderate restriction of the motility in all directions, especially to the right. The fundus was normal and the vision 20/20—, with correction. The left eye was normal and the vision with correction was 20/20+. As no operation was desired, the patient was not seen again for five months, when she returned with the exophthalmos and restriction of the motility in the right eye more pro-

nounced. The vision and fundus were unchanged.

The outer border of the orbit was then removed and a somewhat pyramidal tumor  $1\frac{1}{4}$  inches broad at the base and  $1\frac{1}{2}$  inches long was removed from behind the globe by a blunt dissection, except at the last stage, when a rather firm band had to be cut with the scissors. The exterior of the tumor was very irregular, showing a number of dark nodules, and being cut open before hardening, it proved to consist of a mass of connective tissue filled with spherical pockets from one-eighth to three-sixteenths inch in diameter, each pocket being filled with a mass of coagulated blood. These masses shelled out of the pockets like peas. Toward the center of the tumor the blood clots seemed fresher than toward the periphery.

The operation was followed by no reaction, and the patient went home in two weeks with the vision in the two eyes the same as before the onset of the trouble. The exophthalmos had disappeared, but the motion was still somewhat restricted in all directions. The lower half of the pupil showed a moderate dilatation and did not respond to light or convergence. The fundus was unchanged. I have heard from her from time to time since then, and there has been no sign of a return.

#### COMMENT.

The interest of the last case centers in the unusual nature of the tumor. Without pretending to say that others of the same nature have not been reported, I have not been able to find any. Apparently the tumor was the result of an intermittent leak in some small vessel, the hemorrhages occurring from time to time and becoming encapsulated so that they were separated by well defined walls.

The contents of the cysts in cases 1 and 2 were not examined microscopically nor chemically, but as they presented the characteristic appearance of disorganized blood, they probably resulted from defective blood vessels which leaked more continuously than in Case 3.

Although the feeling and the history of the tumor in Case 3 naturally suggested a much too serious prognosis, it would have made no difference in the treatment, even if the nature of the tumor had been known. In Cases 1 and 2, on the contrary, not only was the prognosis faulty, but if the capsules of these cysts had been a little thicker, I should undoubtedly have persisted in my attempt to enucleate them intact and might have done so at the risk of causing the loss of the eyesight or of the eye in either case.

As to the proper treatment of these and other deep seated orbital cysts, except rare forms like that in Case 3, if such results as were produced in my first two cases can be generally obtained, it is evident that it would be a mistake to attempt to enucleate them; or to cure them by curetting, until the simpler treatment with phenol or something similar has been tried. Whether the injection of tincture of iodine, which some authors suggest (apparently without having tried it themselves), would be as effective and safe may well be doubted. If I were to have a recurrence after using phenol, I should try trichloroacetic acid. It occurs to me that if in the future I should encounter a dermoid having the long, sinus-like extension, which I have occasionally seen in the past, I should destroy the skin lining it with trichloroacetic acid rather than try to excise it or to destroy it with silver nitrate or iodine, as recommended by Buller, according to de Schweinitz.

#### CONCLUSION.

In every case of deep-seated orbital tumor of uncertain nature, the possibility of its being a blood cyst or some other benign cyst should be considered. If an operation is done, the tumor, on being exposed, should be secured by passing a thread through it and its nature should be tested by a puncture. If it proves to be a cyst, thoro cauterization with phenol or something similar in effect should be tried before an attempt is made to extirpate it.



# THE MANAGEMENT OF CASES OF NON-INFLAMMATORY GLAUCOMA, CLASSIFIED AS SIMPLE ANTERIOR OR SIMPLE POSTERIOR GLAUCOMA.

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This paper based on recognition of two classes of glaucoma suggests the operative treatment appropriate to each, and reports the results attained by such treatment in sixty cases. Read before the Canadian Medical Association at Hamilton, May 30th, 1918. Publication approved by Board of Publication, office of the Surgeon-General.

I shall not attempt to discuss the various types of glaucoma, nor to present the characteristics of the different forms of disease, but I shall briefly consider some of the clinical manifestations of the simple non-inflammatory type and suggest a possible classification which may be of assistance in determining the best mode of treatment in the individual case. Usually the type of glaucoma has been the main factor in determining the operation to be performed in a particular case. A study of a limited number of cases of simple glaucoma has suggested the possibility of dividing them into anterior glaucoma and posterior glaucoma, and of considering each division independently from an operative standpoint.

There are many things we do not know about glaucoma, but a few clinical facts stand out clearly in the experience of every one who has studied carefully any considerable number of cases. For instance, it can be stated that there is no direct relation between the tension of the eyeball and the depth of the anterior chamber. While the chamber is shallow in the majority of cases, it not infrequently happens that, although the tension is high a moderately deep chamber will persist. Again, it cannot be definitely stated what degree of tension of the eyeball is pathologic for all cases. That is, the upper limit of the normal tension is not the same for all individuals. Further, there is no definite relation between the tension of the globe as determined by the tonometer, and the contraction of the visual fields. One case with a slight rise of tension will

show deep cupping of the nerve head and serious loss of visual acuity, while another with higher tension over a long period of time, will still retain a surprising amount of vision and fairly full fields. I have no definite knowledge of the relation of the fields to the duration of differing degrees of increased tension. The resisting quality of the tissues involved will always offer an indeterminate quantity and keep the problem most complicated.

Another conspicuous fact is that while many cases of simple glaucoma are relieved after an iridectomy has been performed, others, with an equally perfect operation, are not improved, and a few are made worse.

In the determination of whether or not a case is doing well the field of vision for colors, and especially for form, offers our best guide. The tension, however, as determined by the tonometer, should be taken at frequent intervals and is an indication as to whether or not we may expect an improvement in the field of vision from the treatment. It is dangerous to rely on the diminished tension alone, as it is impossible to know the maximum tension that may be pathologic for the particular case. Diminished tension must be accompanied by visual fields that show improvement, or at least are not deteriorating, before it can be determined that the process is not progressing. The visual acuity may offer some guidance as to the progress of the disease in late cases, but the vision may remain quite normal until the case is far advanced.

Every case of simple glaucoma that has not been given medical treatment



should be given a thorough course for the betterment of the general condition, together with the local use of eserine or pilocarpin before being subjected to any operative procedure.

The fact that an iridectomy at times gives a result that is perfect surgically, and leads to the complete relief of the increased tension, while at other times an operation equally well performed will be unsuccessful, leads to the natural conclusion that if the cases could be properly selected, the iridectomy would be successful in a much larger number. On the other hand, the trephine operation, as developed by Colonel Elliot, of London, England, frequently succeeds in a group of cases which heretofore has been unsuccessfully treated by other methods of procedure. If, then, we can so classify our cases clinically as to enable us to select the group which is relieved by iridectomy or other operation based on freeing the anterior lymph system, and the group best suited for trephine operation, it would offer a definite mode of procedure and possibly lead to the best average results.

For the past four or five years I have attempted to divide clinically all cases of chronic non-inflammatory glaucoma into two groups. (1) simple anterior glaucoma, (2) simple posterior glaucoma. The classification is based upon the assumption that either the anterior or posterior lymph system is more seriously involved, and that the increase of tension of the eyeball is due to the retention of fluids that normally have two sources of outlet, one through the anterior lymph system through the spaces of Fontana, and the other through the posterior lymph system, the perichoroidal space, around the venae vorticosae into Tenon's space, and around the optic nerve.

If the anterior lymph spaces are blocked, there will be a tendency for the excessive fluids to flow toward the posterior outlet, thus tending to hold the lens and iris in its normal position, or at least preventing an entire obliteration of the anterior chamber. If the posterior lymph system is involved and the normal outflow maintained

through the anterior lymph channels, there will be a tendency for the lens and iris to follow the current and gradually to be pushed forward, leading to a shallowing or obliteration of the anterior chamber. There is, then, in the depth of the anterior chamber an indication as to whether the case falls in the anterior or posterior group. In the late stages of all cases the iris base undoubtedly becomes adherent, but this condition should appear earlier and be more marked in the cases classed as posterior glaucoma.

If the anterior spaces are obstructed they may be relieved in part by a broad deep iridectomy. On the other hand, if the anterior spaces are normal and the obstruction is excessive in the posterior lymph channels, an iridectomy will be of no avail.

The means by which a trephine operation relieves the tension has nothing to do with the condition of the lymph channels. It is based almost entirely upon the establishment of a permanent filtering cicatrix which permits excessive fluids in the globe to pass out into a subconjunctival space and there become absorbed.

If, therefore, we have an anterior glaucoma the choice of operation would be an iridectomy. On the other hand, if the posterior system is involved, or both the anterior and posterior are involved the trephine operation will be one of choice. There is one exception to be made. We all know only too well that cases of simple non-inflammatory glaucoma which have so far advanced that the visual fields are contracted to twenty or thirty degrees, do not do well after an iridectomy has been performed. I would therefore make an exception of this group, whether classified as anterior or posterior glaucoma.

In this connection I shall repeat a portion of the results obtained in a series of cases reported before the Clinical Surgical Congress at its meeting held in Philadelphia, 1916, and published in the Archives of Ophthalmology for 1917.

In nineteen selected cases of simple anterior glaucoma in which an iridec-

tomy was performed, a good result was obtained in thirteen cases, or in 72.2%.

In 41 cases of simple posterior glaucoma, or those not suited for iridectomy, which were subjected to the Elliot operation, a good result was obtained in 31 cases, or 75.5%.

The nineteen cases selected for an iridectomy offered a more favorable group for any operative procedure than did those selected for the trephine operation. The results were about the same in each instance.

These cases all occurred in the Ophthalmic Service in the University of Michigan.

To summarize:

1. All cases of simple glaucoma should be given a thoro course of general and local treatment (including careful refraction), before being subjected to any operative procedure.

The general treatment is directed toward improving the patient's condition. The local medical treatment is limited to the use of eserine or pilocarpine.

2. The depth of the anterior chamber offers a basis of classification of all cases of chronic non-inflammatory glaucoma into simple anterior and simple posterior glaucoma.

3. All cases of simple glaucoma which can be classified as anterior, with the exception of those in which the visual field is markedly contracted, should be subjected to an iridectomy, while all cases of simple posterior glaucoma and all cases with markedly contracted field of vision should be subjected to a trephine operation.

I wish to emphasize the fact that these suggestions are all based on clinical observations and have not been verified by the examination of pathologic specimens.

## REFRACTIVE DIFFERENCES IN FOVEAL AND PARAFOVEAL VISION.

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A report of experimental studies made in the Laboratory of Physiology, Leland Stanford University, comparing foveal and parafoveal vision by strong or feeble light, with a discussion of the causes of the phenomena observed, including nine tables, with bibliography.

The suggestion for the present work came from an observation of one of the authors (W.) that glasses which satisfactorily corrected his hyperopia in the daylight proved too strong, that is, "overcorrected," in the evening when out of doors, often to such an extent that they were discarded. This has since been confirmed in several other hyperopes.

An attempt was therefore made to determine the nature and extent of this difference under experimental conditions admitting of satisfactory control, and should such a difference be clearly proven, to explain it on the basis of the known structure of the eye or of changes hitherto assumed to take place in it.

The first experiments were concerned with a comparison of the refraction in foveal vision in the light and in the dark-adapted eye. Since it was soon apparent that these showed no striking differences the work was extended to a comparison of the refraction in the regions near the fovea (parafoveal vision) since it was known that these are used in twilight vision. The data thus obtained permitted the comparison between foveal and parafoveal vision both light and dark-adapted.

The problem of the adaptation of the eye to light and dark has been studied carefully and discussed repeatedly by numerous physiologists and ophthalmologists both from the view point of anatomy and of physiology. Among



these we may count Engelmann ('85), Hering ('95), Fick ('98), Broca ('00), Kries ('01), Piper ('03), Nagel and Schaefer ('04), Garten ('06), ('07), Hess ('07), and Woelfflin ('10). Notwithstanding the considerable amount of investigation in this field, as far as we could discover no one has studied this problem from the standpoint of refraction, and in fact the methods usually employed would preclude this, as the test objects used were placed on the arm of a perimeter or otherwise so near that accommodation was not avoided.\*

The experiments were carried out in the Laboratory of Physiology of the Leland Stanford Junior University, at the suggestion and under the direction of the senior author (W.). The experimental procedure and the statistical handling of the data obtained are almost wholly the work of the junior author (O.); for the discussion and theoretic consideration the authors are jointly responsible. We wish to express our indebtedness to Professor E. G. Martin and other members of the department for suggestions and helpful criticism, to Professor J. E. Coover for his aid in certain statistical questions encountered and finally to those who willingly consented to be the reagents for these experiments.

#### APPARATUS AND METHODS.

All experiments, except a short series with the punctumeter, were made in the dark room. For light adaptation, observations were carried on with three 60 watt lamps placed less than a meter from the reagent, but screened to prevent direct illumination of the eye or test object. For adaptation to dark the uniform procedure was adopted of spending 5 minutes in complete darkness before beginning an experiment. The minimum time for a set of observations was 20 minutes, so that the experiments were carried on

under adequate tho not extreme adaptation.

Observations were uniformly carried on with the test object at 5 meters. The form of the test object proved to be a matter of some difficulty. The parafoveal region used in most experiments lay 5° from the fovea and therefore had, according to the work of H. Dor ('73) a form sensitivity one-fourth that of the fovea itself. For this reason the test object first tried, consisting of parallel wires similar to that mentioned by Landolt ('04), while suitable for the determination of the refraction in the fovea could not be used for the parafoveal regions, and the same was true of test type of any given size.

Since it was desirable to use the same test object for both regions in order to have as few variable factors as possible, a slender illuminated triangle, suggested by the observation of an arch (see Table 7), was finally adopted. An isosceles triangle 15 cm. high and 4 cm. broad at the base was cut from a black screen placed before a ground glass. A uniform illumination of this was obtained from a second ground glass about 60 cm. distant which formed one end of a light-tight box at the opposite end of which and about 60 cm. distant were two 60 watt lamps. The apex of the triangle was sharp enough for a test of foveal vision and its tapering shape was found at the same time to be very well fitted for that of parafoveal vision, tho the apex was, of course, not quite so distinctly seen.

As a fixation point in the case of parafoveal vision use was made of a very small bright spot formed by the light coming thru a small hole (about 0.3 mm. in diameter) in an otherwise light-tight metal case. By appropriate placing of this fixation point the light from the test object could be made to fall on any desired part of the retina outside the fovea centralis.

\* Since writing the above, Dr. Edward Jackson has been kind enough to point out two previous references to this phenomenon. In 1888 (Jackson, '88) he recorded a difference of refraction in the light and in the dark in his own and other cases and gave an explanation which will be considered in another place in this paper. He also noted that Lord Rayleigh (*Encyclopedia Britannica*, 9th ed., Optics) had previously recorded the fact that he was distinctly myopic in a dark room, tho not in the light.



The refraction was determined by a De Zeng phoro-optometer carrying a battery of lenses in quarter diopters with supplementary lenses giving eighth diopters. These latter were not much used, as it was found that the quarter diopters were as small as could conveniently be employed. The usual procedure was to make 40 observations at a sitting as follows: 10 each of foveal and of parafoveal refraction alternately in the light, then 10 each alternately when the eye had become dark adapted. The observer did not, in the majority of tests, know the strength of the lens selected; a too strong convex, or too weak concave lens was placed before his eye by the experimenter at the beginning of the reading, the disc carrying the lenses was turned by the observer until he felt satisfied that the clearest vision was attained, and the lens selected was observed and recorded by the experimenter. Since the chief difference found was between foveal and parafoveal vision and these determinations were made in alternate observations it seems improbable that any factors influencing accommodation should differ and this belief seems justified by the results obtained when homatropin was used (see table 6).

In some tests artificial pupils of different sizes (2, 3, and 4 mm. in diameter) were used, placed close to the observer's cornea. As a check on the accuracy of observation of the test object a series of determinations were made with a shaking slit; a piece of apparatus employing the principle of Scheiner's experiment, which will be more fully described in a forthcoming paper.

Observations were made upon ten people who are designated in the table by Roman numerals. No. I was F. W. Weymouth, No. II Mr. W. H. R., an instructor in another department who had had considerable experience in observation, No. III Miss L. W., an assistant in the Physiology Department, No. IV Mr. J. K. L., No. VIII Mr. T. F., No. X Mr. M. T., students of the university, No. V Mr. K. N., No. VII

Mr. T. A., No. IX Mr. O. M., the latter two university professors, and No. VI was D. Ogata.

In all cases the right eye was used and tho hyperopes and myopes were not excluded astigmatism was carefully tested for and excluded or corrected.

When a punctumeter was made use of, a card with two tiny holes of different sizes, one for foveal and the other for parafoveal vision was employed, instead of the ordinary test card attached to this instrument. The distance of these two holes must be calculated for each ametropic eye.

In addition to the difficulty of the accurate calculation of this distance, the change of the position of the test object, which naturally must take place in the use of this instrument, makes the results even more inaccurate.

Because of the difficulties in the use of the punctumeter, and the defects in the method first tried of using separate test objects for foveal and parafoveal vision, it seems to us that the observations made with the same test object (triangle), approaching as it does, more closely to the conditions met with in the ordinary use of the eyes, was by far the most satisfactory and we will confine ourselves chiefly to a consideration of the results obtained in this way.

#### RESULTS OF EXPERIMENTS.

It was originally the intention to present the results of the experiments in tabular form as this is the only way in which the original data can be adequately recorded. These tables have, however, proved too bulky for the present publication and the numerical results will be given partly as much abridged tables and partly as summaries. In considering these it must be borne in mind that the differences are usually small; and that only by the treatment of large numbers of observations according to modern statistical methods can their significance be shown. As presented the actual values of the lenses used, and the values of the standard deviation or other measure of the variability, have had to be omitted. Only differences, with the

value of their probability of significance have been given in most cases.

The determination as indicated above of refraction in the light and in the dark, both in foveal and parafoveal vision, made possible six comparisons as follows:

1. Foveal light with foveal dark;
2. Parafoveal light with parafoveal dark;
3. Foveal light with parafoveal light;
4. Foveal dark with parafoveal dark;
5. Foveal light with parafoveal dark;
6. Foveal dark with parafoveal light.

It is plain that the first and second combinations differ only in the condition of illumination and that the third and fourth differ only in the region of the retina considered.

These six comparisons were carefully made for each of the ten reagents, there usually being available 20 observations evenly divided between the two contrasted conditions, tho in some cases 40 to 80 observations could be compared.

#### 1. Differences in refraction between vision in light and vision in dark.

The first two comparisons are given in Table 1.

that was clearly above the range of experimental error while a second approached this. In these the difference was about a quarter of a diopter. The other reagents are equally divided between opposing results too small or too variable to be significant and may therefore be considered the same in the light as in the dark.

In parafoveal vision here and elsewhere unless the contrary is stated the fixation point was placed on the right side of the test object and at such a distance that the image of the latter would fall about 1.378 mm. temporally from the fovea centralis. The line connecting this point with the nodal point would thus make an angle of about 5° with the visual line. In parafoveal vision the results are essentially the same as in foveal vision, tho it may be noted that the significant differences are shown by different reagents than in the first case.

The small number of reagents showing significant differences, the fact that these are not the same in foveal and in parafoveal vision, and the small amount of the differences, combine to indicate that this type of difference is neither very common nor very important, tho its pres-

TABLE 1

A Comparison of Foveal Refraction in the Light and in the Dark, and of Parafoveal Refraction in the Light and in the Dark.

Value of $x/\sigma$	More Myopic or Less Hyperopic in Dark			Less Myopic or More Hyperopic in Dark			Equal
	4 or More	3 to 4	Less Than 3	4 or More	3 to 4	Less Than 3	
Foveal vision—							
Reagent .....	V	IV	I, II, III, IX			VI, VII, VIII, X	
No. observations	20	20					
Difference in D.	.28	.23					
Parafoveal vision—							
Reagent .....	I	II, III	V, VII, IX			IV, VI, VIII, X	
No. observations	40	20, 40					
Difference in D.	.35	.12, .20					

The reliability is indicated by the values of  $x/\sigma$  which represent the probability of significance of the differences of the means. Where this value is 3 there are 135 chances in 50,000 that the difference is accidental; when 4, 3 chances in 50,000 (Davenport, '14). We have uniformly considered those differences where  $x/\sigma$  equals 4 or more as significant. The ten reagents are represented by the Roman numerals as before stated. The number of observations and the amount of the differences have not been recorded in those cases where differences were so small as not to be significant. These explanations apply to most of the following tables.

It will be seen that of the ten reagents only one showed a difference between foveal vision in the light and in the dark

ence in 10 to 20 per cent of the people examined can hardly be doubted and in all these cases it was in the same direc-

tion. It is possible that these differences would be greater with more extreme conditions of illumination than those here used.

## 2. Differences in refraction between foveal and parafoveal vision.

The remaining four of the six possible comparisons outlined above, in which different parts of the retina, or in addition to this different illuminations are contrasted, remain to be presented and are given in Table 2.

mutually cancelling. The differences are thus plainly greater than those shown in Table 1 and exhibited by more of the reagents. This conclusion is strengthened by the fact that the four reagents which gave significant differences in all the comparisons are those who were experimented upon more than the regulation 20 times, or were more experienced in observation, or both.

Let us examine the data more in detail. When foveal vision in the light is

TABLE 2.

A Comparison of Foveal with Parafoveal Vision Under Varying Conditions.  
(See Table 1 for further explanations.)

	More Myopic or Less Hyperopic in Parafoveal Vision				Less Myopic or More Hyperopic in Parafoveal Vision							
Value of $x/\sigma$	4 or More			3 to 4	Less than 3	4 or More			3 to 4	Less than 3	Equal	
	Reagent	No. of observations.	Difference in D.			Reagent	No. of observations.	Difference in D.				
Foveal light	I	40	.32		IV,V,VII,X					III, IX		
With	II	20	.28									
Parafoveal	VI	74	.40									
Light	VIII	40	.45									
Foveal dark	I	40	.65	VII	X .....				IV	III, IX	V	
With	II	20	.38									
Parafoveal	VI	80	.37									
Dark	VIII	40	.47									
Foveal light	I	40	.67	VII	III .....					IX, X	IV	
With	II	20	.40									
Parafoveal	V	20	.28									
Dark	VI	77	.36									
	VIII	40	.32									
Foveal dark	I	40	.30	VII		III	40	.24	IV, V	IX		
With	II	20	.26									
Parafoveal	VI	77	.41									
Light	VIII	40	.60									
	X	20	.24									
Distribution of the 40 cases.	18			3	6	1			3	7	2	

Considerable individual variation is seen, but it will be noted that in each comparison four or five of the ten reagents are distinctly more myopic or less hyperopic in parafoveal vision, while the reverse is true in only one case of the forty comparisons made. The less decisive cases including two which showed no difference are, as before, about equally divided and may be looked on as

contrasted with parafoveal vision in the light, or foveal dark, to use an abbreviated expression, is contrasted with parafoveal dark so that the only differing factor is the part of the retina used, the same four reagents show clear differences. In VI and VIII these are practically the same in the two cases, but in I and II where, as shown in Table I, there was a difference between parafo-



veal light and parafoveal dark the comparison of foveal dark with parafoveal dark gives a larger difference than the similar contrast in the light. The remaining comparisons show the same fact with the addition of positive results in two additional reagents.

These comparisons, therefore, show something of the difference already noted between light and dark, but the differences between foveal and parafoveal vision are so much greater as to be very striking, and the average of these four comparisons may with justice be taken as the difference between foveal and parafoveal vision.

To summarize, somewhat less than half of the people examined show significant differences of refraction amounting to .25D or .50D between foveal and parafoveal vision, and in practically all cases this difference is of the type showing more myopia or less hyperopia in parafoveal vision.

### 3. Differences in refraction between foveal and various parafoveal portions of the retina.

Having seen that there were marked differences between the fovea and part of the retina lying 5° temporally from it, experiments were next carried out to see if the same were true of points in different directions and at different distances from the fovea.

The first series was carried out as follows: The image was made to fall nasally from the fovea by shifting the fixation point to the left of the test object,

and inferior and superior portions were tested by placing it above and below. In the two latter cases the triangular test object was laid on its side to make more accurate the measurement of the distance from its apex to the fixation point. The results of the tests in the four directions are given in Table 3.

Observations on only four of the reagents were available for this and in some of the cases only two reagents. It will be seen that in all of the significant cases and in most of the less decisive ones the observers proved, as before, more myopic in parafoveal vision. The differences, as in the cases that we have already considered, are between foveal and parafoveal vision. Altho not shown in the table the differences between foveal light and dark and parafoveal light and dark are none of them large or constant enough to be significant. Reagent I shows a clear difference in all directions, as do II and VIII in all the directions examined. Reagent VI showed a definite refractive difference on the temporal side in all four observations, but on the inferior, superior and nasal progressively less clear differences.

The amounts of the refractive differences with the corresponding differences in the focal lengths are given in Table 4. Since the observers were more myopic or less hyperopic in parafoveal vision, this would require that the posterior principal focus would be farther from the cornea by the distances in millimeters given in the table. It will be seen that

TABLE 3.

A Comparison of Foveal Vision with Parafoveal Vision in Different Directions from the Fovea.

x/σ	More Myopic or Less Hyperopic in Parafoveal Vision			Less Myopic or More Hyperopic in Parafoveal Vision.			Equal
	4	3	Less than 3	4	3	Less than 3	
Nasal .....	I, I, I, I II, II, II	II	VI, VI, VI, VI				
Temporal .....	I, I, I, I II, II, II, II VI, VI, VI, VI VIII, VIII, VIII, VIII						
Inferior .....	I, I, I, I	VI, VI	VI, VI				
Superior .....	I, I, I, I	VI	VI, VI			VI	

Only four of the reagents appear in this and the following table as the corresponding data were not obtained from the others.

TABLE 4.

The Refractive Differences in D Between Fovea and Parafoveal Region (5° from the Fovea in Nasal, Temporal, Inferior and Superior Direction) with the Corresponding Differences in Focal Length in mm. in the Eye.

Reagent.	I.		II.		VI.		VIII.		Average.	
	D	mm.	D	mm.	D	mm.	D	mm.	D	mm.
Nasal .....	.275	= .0914	.21	= .0698	.055	= .01825			.18	= .0598
Temporal ....	.50	= .1660	.33	= .1095	.385	= .1278	.44	= .1460	.414	= .1373
Inferior .....	.72	= .2390			.135	= .0448			.427	= .1419
Superior .....	.85	= .2820			.080	= .0265			.465	= .1542
Average .....	.586	= .1946	.27	= .0896	.164	= .0544	.44	= .1460	.371	= .1233

Nasal, temporal, inferior and superior represent the direction from the fovea centralis. For other explanations see Table 1.

the average of the four reagents in all the directions is .1233 mm. or about one eighth of a millimeter corresponding to a refractive difference of .37 D.

It is thus clear that the differences between foveal and parafoveal vision seen in the first tables is not an accident depending upon the point chosen but is true at least in some of the reagents of parafoveal regions in all directions, at a distance of 5°.

This point having been established the question arose whether the same differences would be found at other distances than the 5° first chosen. Observations

were accordingly carried out at distances of 2°, 3° and 4° with reagents I and VI and the results are presented in Table 5.

The following values in diopters are obtained from averages for all comparisons between foveal and parafoveal visions in the above table:

	2°	3°	4°	5°
I .....	.175	.5375	.4375	.485
VI .....	.25	.35	.4875	.385

In the two cases furnishing enough data for this comparison the difference between foveal and parafoveal vision increases quite regularly up to 3 or 4 degrees. The horizontal diameter of the

TABLE 5.

A Comparison of Foveal Vision with Parafoveal Vision at Different Distances from the Fovea. This Data Was Obtained from Only Two of the Reagents.

Comparison of—	Reagent	Angular Distance from Fovea.			
		2°	3°	4°	5°
Foveal light with foveal dark,	I	.07 D.	.10 D.	.05 D.	.02 D.
	VI	.0	.0	.025	.01
Parafoveal light with parafoveal dark,	I	.08	.025	.175	.35
	VI	.0	.0	.05*	.04
Foveal light with parafoveal light,	I	.17	.475	.325	.32
	VI	.25	.35	.50	.40
Foveal light with parafoveal dark,	I	.25	.50	.50	.67
	VI	.25	.35	.45	.36
Foveal dark with parafoveal light,	I	.10	.575	.375	.30
	VI	.25	.35	.525	.41
Foveal dark with parafoveal dark,	I	.18	.60	.55	.65
	VI	.25	.35	.475	.37

Where the value of  $x/\sigma$  is more than four the differences are in italics. In all such the observer proved more myopic or less hyperopic in the dark or in parafoveal vision, with the exception of the value starred.

fovea as given by different authors ranges from slightly over 0.1 mm. to 0.2 mm. But Dimmer ('94) gives 1.7 as the average of 6 cases. This would place the margin of the fovea about  $3^\circ$  from its center and at a point where our differences reach their maximum.

#### 4. The results obtained with other methods.

The above results, which show a consistent difference in refraction between foveal and parafoveal vision in at least four out of ten observers, are supported by a limited number of experiments in which refraction was measured by other methods or under other conditions.

clearly that accommodation is not a causal factor.

A short series of preliminary experiments in which a partially illuminated arch seen from the laboratory window in the evening was used as a test object is here given. Though few in number these observations are interesting as they represent the conditions under which the eyes are normally used at night.

#### The test with the shaking disc.

This test was very difficult and needed much preliminary training. The test object and the part of retina experimented upon were not always the same, consequently the results were not uniform

TABLE 6.

The Refraction in Foveal and Parafoveal (Temporal) Vision After Paralyzation of Accommodation by Homatropin (No. VI).

Test.	1	2	3	4	Average
Foveal (light) in D.....	-4.06 (6)	-4.024 (6)	-4.00 (6)	-4.00 (6)	-4.021
Foveal (dark) in D.....	-4.05 (5)	-4.024 (5)	-4.024 (5)	-4.00 (5)	-4.024
Parafoveal (light) in D...	-4.375 (6)	-4.625 (6)	-4.50 (6)	-4.50 (6)	-4.500
Parafoveal (dark) in D...	-4.65 (5)	-4.70 (5)	-4.55 (5)	-4.55 (5)	-4.612

	Average.
Foveal .....	-4.0227
Parafoveal .....	-4.5562
Difference .....	.5335

The figures in parenthesis indicate the number of observations.

In No. VI accommodation was paralyzed by homatropin and a series of measurements were made. The test objects were not the same as in the experiments above described but the difference in refraction between the fovea and a point  $5^\circ$  distant temporally is as marked as in the tables previously given, showing

but the refractive difference between foveal and parafoveal vision is clearly apparent.

#### The test with the punctumeter.

The appearance and disappearance of a small hole or a spot on test card was adopted for determination of refraction. Two of the records from Nos. I and VI are given.

These experiments show a refractive difference between foveal and parafoveal vision always in the same sense, namely that the reagent was more myopic or less hyperopic in parafoveal vision than in foveal vision.

TABLE 7.

The Refraction of the Fovea and the Parafoveal Region (Temporal) with an Illuminated Arch as a Test Object. (No. 1).

Test	1	2	3	4	5	6	7	8	9	10	Average
Foveal in D.....	+ .75	+ .75	+ .50	+ .50	+ .50	+ .50	+ .50	+ .50	+ .50	+ .50	+ .55
Parafoveal in D..	+ .75	+ .25	+ .50	+ .25	+ .25	+ .25	+ .50	+ .50	+ .25	+ .50	+ .40

(8 P. M., Feb. 6, 1918.)

Foveal in D... ..	+ .50	+ .75	+ .75	+ .75	+ .75	+ .50	+ .50	+ .50	+ .50	+ .50	+ .60
Parafoveal in D..	+ .50	+ .50	+ .50	+ .50	+ .25	+ .50	+ .25	+ .25	+ .00	+ .25	+ .35

(Evening, Jan. 28, 1918.)



It will thus be seen that the data obtained by different methods are concordant and the differences in refraction are such as would appear in any careful series of measurements.

portion, the clearest image will be formed correspondingly nearer the cornea, thus giving a condition of myopia or lessening the hyperopia.

In the present work it has been shown,

TABLE 8.

The Refraction in Foveal and Parafoveal (Temporal) Vision Tested with a Shaking Disc (I and VI).

Reagent.	I.	I.	VI.
Foveal in D.....	+ .61 (10)	+ .45 (10)	- 4.109 (16)
Parafoveal in D.....	+ .54 (10)	+ .35 (10)	- 4.656 (16)
Difference in D.....	.07	.10	.547

See Table 1 for explanation.

TABLE 9.

The Refraction in Foveal and Parafoveal (Temporal) Vision Tested with a Punctometer (I, VI).

Reagent.	I.	I.	VI.	VI.
Foveal (light) in D.....	+1.899 (10)	+1.536 (10)	-2.297 (10)	-1.741 (10)
Parafoveal in D.....	+1.625 (10)	+1.112 (10)	-2.696 (10)	-2.779 (10)
Difference in D.....	.274	.424	.399	1.038

See Table 1 for explanation.

DISCUSSION.

In considering the results just presented we will endeavor to distinguish sharply between the observed facts and their interpretation. The present observations and the earlier observations of Jackson and Rayleigh have established a difference in refraction in many people between vision in intense or ordinary and in very weak illumination, or in other words between daylight and twilight or night vision. This difference is such that the observer becomes more myopic or, if hyperopic, less hyperopic in passing from the light into the dark.

Jackson considered this as due to the difference in the size of the pupil. Symmetric aberration is present in most eyes and this is usually of the type in which the refractive effect of the marginal part of the cornea and lens, which is usually excluded by the iris, is greater than that of the central part. When, in the dark, the greatly widened pupil allows light to enter thru this peripheral zone it is more sharply refracted, and if the amount of light thus entering is in excess of that entering thru the central

however, that while there are in some reagents small differences in refraction between foveal vision in the light and in the dark or between parafoveal vision in the light and in the dark, the significant differences lie between foveal and parafoveal vision. Before considering how such differences can be responsible for the differences between vision in daylight and in a dimly lighted room which formed the point of departure for the present discussion, let us restate the proofs for the above conclusion. In part of the experiments artificial pupils as small or smaller than the size of the pupil in the light were used without affecting the results. When homatropin was used and maximum dilation of the pupil was present the difference between foveal and parafoveal vision amounted to about .5 D, as much as under ordinary conditions. Here, of course, any influence of pupillary size is impossible.

Even without these special experiments the ordinary routine of observation would have excluded the effect of the size of the pupil. As already stated this was to take 20 alternate readings of

foveal and parafoveal vision in the light and to follow this with a similar set in the dark. In the first set of foveal and parafoveal observations in the light the size of the pupil, of course, remained unchanged, yet the difference in refraction was clear and definite and much greater than that between the foveal observations of this set and those of the next with widened pupil in the dark.

If, then, the refractive difference is chiefly one between foveal and parafoveal vision, why was it first observed as a result of a change in illumination, such as passing from daylight to a dimly lighted room? The explanation is not difficult. As is generally known (Piper '03 and others) the parafoveal region in dark adaptation becomes more sensitive to light than the fovea, a circumstance which accounts for the fact that a very faint star often disappears when looked at, to reappear when the eye is directed a little to one side. Simon ('04) has further shown that when feebly illuminated points are looked at, in exclusion of other sources of light, parafoveal points are used by preference in fixation, the distance and direction of these from the fovea depending upon the particular eye examined and the degree of dark adaptation. In other words, the physiologic center of the retina, or preferred fixation point, migrates from the center of the fovea with bright illumination, to a region  $2^\circ$  or more distant in dim light. This same parafoveal region under ordinary light conditions can become the object of our attention only by special care in fixation; and the limitation of the number of stimuli in the visual field as in our experiments in the dark room. These facts may be verified by any one who will carefully observe in a very dim light fine objects such as the branches of a tree. These may be more clearly seen if not "looked at" directly; and if an effort is made to see fine details it will be noted that the object is not in the same part of the visual field that is used in daylight vision, that is to say, a parafoveal region is being used for fixation. Daylight vision is therefore foveal vision, vision in dim lights is to a greater or less degree parafoveal vision; thus the present experimental results and the original

observations in light and dark are in accord.

It is unnecessary to return to the point, already discussed, of the relative importance of the differences between vision in light and dark and between foveal and parafoveal vision. Small differences due solely to the amount of light appear in perhaps 10 to 20 per cent of the reagents, larger differences due to the portion of the retina used appear in about 40 to 45 per cent. The general observation of refractive difference between light and dark is due to the combined effect of these two differences, which are both in the same direction. Before considering the possible causes of these it may be well to point out some of the practical effects of the entire difference.

Jackson in the paper previously cited has pointed out one *effect of this difference* in causing eyestrain, where in near work in bright light the contracted pupil causes increased hyperopia. It may also be pointed out that the refractive difference under discussion has an important practical bearing on the correction of the vision of persons who have responsible positions involving vision in dim lights, as railway engineers, firemen, signalmen ship's lookouts and the like. If such persons from ametropia wear glasses of any type it should be borne in mind that they may show marked enough differences in refraction between light and dark (up to 0.5 D, as in some of the persons here examined) to make glasses fitted in the ordinary way quite unsuitable. This for instance was found to be the case with one of the writers (W.) where a  $-0.5$  D lens in addition to the usual correction gave very greatly improved vision out of doors in the evening. Care should therefore be taken to test such persons in a dim light to see if differences exist, or if this is impractical, pains should be taken not to overcorrect (not to give too strong a convex or too weak a concave lens) as this will tend to accentuate the difficulty of vision in dim lights.

That differences in refraction due to changes in the size of the pupil may affect the results obtained with the retinoscope was pointed out by Jackson. That differences between foveal and parafoveal vision may also enter to complicate



the result seems probable, as in consequence of the practice of having the person observed fix the brow of the observer or the upper edge of the mirror, it is a parafoveal region that occupies the center of the illuminated pupil. Detailed study of the differences found between the results of retinoscopy and subjective examination while still under the effect of the cycloplegic might show them to be differences between foveal and parafoveal vision; but these data were not available and there has been no opportunity for carrying out such tests.

We may now turn to a consideration of the *causes of these differences*. In the case of the differences between vision in the light and dark where the same part of the retina is used in both, Jackson's explanation of the effect of the widened pupil, already detailed, seems adequate; tho it is perhaps difficult to see why those reagents showing this difference in foveal vision and therefore presumably exhibiting an optical system of the type suggested, should not show the same difference in parafoveal vision, but as noted this was not the case.

Before discussing the possible causes of the observed difference between foveal and parafoveal vision it will be well to outline these conditions clearly. The differences are such that if the refractive surfaces should remain unchanged the posterior principal focus would lie more distant from the cornea (or nodal point) in parafoveal than in foveal vision, and would accord with an anatomic arrangement placing the sensitive elements further from the cornea at a distance of  $5^{\circ}$  from the fovea than in its center.

If on the other hand the sensitive elements are all equally distant from the nodal point the refractive surfaces must undergo changes such that they become more strongly refractive in parafoveal vision so that with the same correction the posterior principal focus lies in front of the sensitive elements.

A third possibility must be considered. It is possible that neither the anatomic arrangement nor the refraction varies between the fovea and the parafoveal region to any significant extent, and that the differences are physiologic—differences in the use that is made of sim-

ilar retinal images by different sensitive elements. Careful observation of the test object, particularly in the dark, shows, for instance, the presence of a halo due to the more sharply refracted portions of the cone of light which, as is known, shows this form of symmetric spherical aberration. It might be considered possible that this halo, which increases in size as a more converging lens is used, could stimulate the more sensitive parafoveal region in the dark adapted eye; and hence lead to the choice of a less converging lens. But the conditions are reversed in the light adapted eye where the foveal region is the more sensitive. For this reason the differences would be neutralized in the various comparisons and could hardly become a factor in the results obtained.

A purely objective method of determining the refraction would have been highly desirable but we are unacquainted with any method capable of precise localization in the retina and at the same time accurate enough to give such slight differences of refraction as those here dealt with. According to Landolt ('04) it is not very easy even for a good observer to give in parafoveal vision the definite moment at which he sees the object most clearly. This well known difficulty of observation was of course encountered; but that it was not the determining factor in the results is indicated by the fact that the variability of the parafoveal observations was not markedly greater than that of the foveal. The average standard deviation of the ten observers for foveal vision was .06 D, for parafoveal vision .086 D.

That the less keen form sense of the extrafoveal region leads to some difference in the utilization of the image is not impossible, but in the absence of more positive evidence we will disregard it. Certain other physiologic factors i. e. the possible change of the length of cones and rods, the pigment migration, the decolorization of visual purple, etc., changes most marked between light and dark adaptation where the observed refractive differences were least, can not, therefore, be causal factors and need no further consideration.



Turning to the physical factors which must be considered here, the effect of the size of the pupil would early suggest itself. This, of course, differs only between light and dark adaptation, while the difference in refraction is found between foveal and parafoveal vision, without change in adaptation, consequently the size of the pupil can not be a determining factor. Tests were, however, made with artificial pupils of 2, 3 and 4 mm. diameter, but we failed to find any observable effects. It is interesting to note that Cobb ('15) working with an even wider range of pupillary diameter (2.8 to 5.6 mm.) failed to find any marked effect on visual acuity.

The accommodation of the eye was practically excluded on account of the arrangement for the experiment already discussed, but as a precaution we used homatropin and found that the cessation of accommodation made the observation much more decisive without affecting the results in any way (see Table 6).

If we look at the fixation lamp, the light from the test object situated  $5^\circ$  from the former falls obliquely on the refractive surfaces of the eye. This would cause shortening of the posterior focal length as compared with light falling perpendicularly (Tscherning '03), and would necessarily be corrected by less converging lens. The angle  $\alpha$  of Donders in the four cases under consideration (Nos. I, II, VI, VIII) was determined as follows:

Direction of the visual line as compared with the optic axis:

		Nasal	Superior	Inferior
I	(R. eye)	$8^\circ$	8'	4'
II	(R. eye)	$5^\circ$	57'	41'
VI	(R. eye)	$6^\circ$	10'	...
VIII	(R. eye)	$4^\circ$	47'	$1^\circ$ 19'

As is clear from this table the fovea centralis is situated on the right side of the optical axis. Thus the above assumption would explain the differences when the fixation point is placed on the right side of the test object, for the rays from the latter would fall more obliquely than in foveal vision; and focus before reaching the retina, thus necessitating the correction by less converging lens. But

when the fixation point is placed on the left side of the test object, the rays from the latter would fall more perpendicularly than in foveal vision and be corrected by a more converging lens. The fact is, nevertheless, that a less converging lens was also selected in this case. Besides this the amount of refractive difference did not vary in proportion to the amount of angle  $\alpha$  (compare with Table 5). Furthermore in the case of No. I the angle  $\alpha$  in the vertical meridian was very small as in the other three cases, but the refractive difference was very large. Those considerations make the above assumption that the differences of refraction are due to differences in obliquity of the incident light, highly improbable.

According to the investigations of Golding Bird and Schaefer ('95), and Dimmer ('94) the diameter of the fovea centralis does not exceed .2 mm. and therefore a parafoveal retinal region  $5^\circ$  from the fovea would lie outside of the latter.

The difference of refraction which we have mentioned above might be ascribed to the difference in distance of the center of the fovea and the parafoveal point from the nodal point. The radius of the globe is about 12 mm. while the nodal point is more than 15 mm. from the retina, so that the hemisphere formed by the posterior part of the globe would lie everywhere somewhat in front of a similar hemisphere described about the nodal point and also passing thru the retina where it cuts the optic axis. As the fovea is situated closer to the optic axis, the distance of this point from the nodal point will be greater, tho in a very slight degree, than that of the above parafoveal point. On this assumption parafoveal vision would be corrected by a more converging or a less diverging lens, but this is just contrary to the results obtained, hence the above assumption is either incorrect or its effects masked by more important factors working in the opposite direction.

The refraction of the retina itself is worth discussing. Light from objects accurately seen enters the retina from the vitreous with such a degree of convergence as would bring it to focus in

the outer layers of the light sensitive elements. The posterior focal length of such rays in the retina is, therefore, the thickness of retina or slightly less. Any degree of curvature greater or less than that of a sphere of that radius would cause bending, if the retina is more or less dense than vitreous. If there was any considerable refraction by the retina the parafoveal region would be one of great astigmatic distortion because of the toric surface offered by the rim of the foveal depression. The visual acuity should then suffer a sudden drop in this region to rise again somewhat beyond it, but there is no evidence of this. Parallel lines also should appear very different above and to the side of the fovea which is not true. We may therefore dismiss the possibility of the refraction of the retina as a factor in the refractive differences observed.

Ametropia might be thought to play some influential part in the results. In four cases under consideration one was hyperopic, another was myopic and the rest were almost emmetropic, but the refractive differences were found always in the same sense. Therefore these refractive anomalies are not directly connected with the observed differences. Extremely high myopia involving posterior staphyloma (Otto '97) was not present in any of the subjects.

Finally the anatomic structure of the eye should be considered. The difference of refraction established may be due to individual difference of the shape of eyeball, entailing a corresponding difference in the curvature of retina. But to consider the difference as individual would seem incorrect as it is too regular (always in the same sense) and too frequent (four times out of ten).

It is also possible that different sensitive elements are functioning in foveal and parafoveal vision, as their histologic differences suggest. But this is not at least the principal cause because the refractive difference did not depend on adaptation.

Greeff ('00) and others found that cones decrease in length from the fovea centralis to the periphery of the retina. Near the margin of the fovea they are

21 $\mu$  and at the periphery of the macula lutea 31 $\mu$  shorter than those at the central part of the fovea. Calculations from the photograph given by Johnson ('96), and the diagram by Fritsch ('08), show that the cones at about 3° distant from the fovea are respectively .068 mm. and .04 mm. shorter than at the center of the fovea. The refractive difference between foveal and parafoveal vision which was established gives .1095 to .1660 mm. on the temporal side of retina, from the fovea (see Table 4), the average of all measurements being .1233 mm. i. e. double or treble the amount of difference given by these investigators. In reality it is greater than even the whole length of a cone (Greeff and others) of the fovea. This histologic peculiarity in the foveal cones does not therefore account for the fact.

The remaining anatomic feature which would explain the fact is the external fovea. Whether such a cupping of the external surface of the entire retina is normally present or is an artefact has been a subject of controversy. It has been carefully described by Golding Bird and Schaefer and flatly denied by Greeff and Dimmer as a normal feature of the retina.

Many investigators, Cicaccio ('80), Wadsworth ('81), Schultze, Fritsch ('08), Salzmann ('12) agree, that the membrana limitans externa is bent inward due to the greater length of the foveal cones; and Fritsch, who denies the existence of an external fovea, figures not only this cupping of the membrana limitans externa, but also a difference in level of the tips of the cones and even of the pigment layer; which while it is not called external fovea seems to differ only in degree (30 $\mu$ ) from the structure described by Golding Bird and Schaefer.

The cupping was described by Golding Bird and Schaefer as measuring .133 mm. in depth and less than 1 mm. in diameter; both measurements would of course vary in individual cases. This measurement of the depth of the external fovea is very near to the value which we obtained as an average of the difference of the focal length between foveal



and parafoveal vision .1233 mm. (see Table 4). The results in case No. I where definite differences were established in all four directions from the fovea combined with the conclusions shown in Table 5, that the difference between foveal and parafoveal vision increased gradually with the increase of the distance from the fovea, would especially favor the existence of such structure. The results in case No. II also suggest that it is very probable. In case No. VI the definite difference was limited to the temporal side but suggested in the other three directions. Case No. VIII gave a definite difference on the temporal side, which side only was examined.

As far as we know this is the only evidence from the living eye supporting the conception of an external fovea and while limited in extent and apparently subject to individual variation it is certainly not to be described as an artefact.

With due regard to the uncertain status of the "external fovea" and to the individual variation shown both in the anatomic studies (Fritsch has insisted on the great individual variation in many features of the retina); and in the results here obtained it seems necessary to assume that the structure of the macula in many eyes is such that the essential parts of the light perceiving elements lie more distant from the cornea in one, two, three or all directions from the fovea than in the fovea itself. This we may do without prejudice as to the name by which it may be called, and leave its further fate to progress in the difficult field of retinal histology or to measurement of the living eye of the type here attempted.

That the problem is complicated is apparent and it is not unlikely that several of the factors mentioned or others here neglected may be involved; but we feel that the most important element is the anatomic arrangement of the light perceiving structure of the retina.

#### CONCLUSIONS.

1. Small differences of refraction between foveal vision in the light and in the dark, and between parafoveal vision in

the light and in the dark, are shown by 10% to 20% of the reagents examined.

2. A definite refractive difference between foveal and parafoveal vision is shown by 40% to 45% of the reagents. The difference between the fovea and a spot 5° excentric (temporally) from it, amounts to from .33 D to .50 D, the parafoveal region being more myopic or less hyperopic than the fovea.

3. The observation that glasses suitable in bright light become less so in dim light accords with the facts established.

4. These facts have a practical application in the correction of refractive errors. Care should be taken in those cases where the person must distinguish signals in dim light (railway engineers, firemen, signalmen, ship's lookouts, etc.) to see that the glasses given are suitable for twilight vision, as in a certain percentage of cases the correction under ordinary conditions is distinctly different from that in dim lights.

5. A possible explanation is offered by the present facts for the differences found between the refraction as determined by the retinoscope and by subjective methods under otherwise similar conditions.

6. The differences found between foveal vision in the light and in the dark or parafoveal vision in the light and in the dark seem to be best explained by Jackson's theory of the influence of the widened pupil in the dark adapted eye in admitting the peripheral more strongly refracted rays.

7. The difference between foveal and parafoveal vision does not seem to us to be due to optical factors affecting the incident light in the two cases, but is more satisfactorily explained by the assumption that the membrana limitans externa bulges outwards (away from the vitreous) in one, two, three or all directions from the fovea. In the latter case the conditions are those which have been described by histologists as an external fovea.



## BIBLIOGRAPHY.

- Broca, A. '00 *Compt. rend. de l'acad. de science*, CXXXII, 795.
- Ciaccio, G. V. '80 *Rendic. dell' accad. della scienze dell' institutio di Bologna*, Vide Jahresber. f. d. Fortschr. d. Anatom. u. Physiol., IX, (1), 323.
- Cobb, P. W. '15 *Amer. Journ. of Physiol.*, XXXVI, 335.
- Davenport, C. B. '14 *Statistical Methods*, New York, John Wiley & Sons.
- Dimmer, F. '94 *Beitraege zur Anatomie und Physiologie der Macula lutea*, Leipzig und Wien, F. Deuticke, Vide R. Greeff.
- Dor, H. '73 *Arch f. Ophthalmol.*, XIX, No. 3, 316.
- Engelman, Th. W. '85 *Archiv f. d. ges. Physiol.*, XXXV, 498.
- Fick, A. E. '98 *Archiv f. Ophthalmol.*, XLV, 336.
- Fritsch, G. '08 *Ueber Bau und Bedeutung der Area centralis des Menschen*, Berlin, Georg Reimer, 44 and 102.
- Garten, S. '06 *Archiv f. Ophthalmol.*, LXIII, 112.
- '07 *Zentralbl. f. Physiol.*, XXI, 502.
- Golding Bird, C. H. and E. A. Schaefer. '95 *Journ. internat. d'anatom. et de physiol.*, XII, 1 and 247.
- Greeff, R. '00 *Graefe-Saemisch Handbuch der gesamten Augenheilkunde*, I Teil, I Bd., V Kap., 173.
- Hering, E. '95 *Archiv f. d. ges. Physiol.*, LX, 519.
- Hess, C. '07 *Archiv f. Augenheilk.*, LVII, 298.
- Jackson, Edward. '88 *Symmetrical Aberration of the Eye*. *Trans. Am. Ophth. Soc.*, V, 5, p. 141.
- Johnson, G. L. '96 *Archives of Ophthalmol.*, XXV, No. 445.
- v. Kries, J. '01 *Zeitschr. f. Psychol. u. Physiol. d. Sinnesorg.*, XXV, 225.
- Landolt, E. '04 *Graefe-Saemisch Handbuch der gesamten Augenheilkunde*, II Teil, IV Bd., I Abt., I Kap., 570.
- Nagel, W. A. und K. L. Schaefer. '04 *Zeitschr. f. Psychol. u. Physiol. d. Sinnesorg.*, XXXIV, 271.
- Otto, F. '97 *Archiv f. Ophthalmol.*, XLIII, No. 3, 543.
- Piper, H. '03 *Zeitschr. f. Psychol. u. Physiol. d. Sinnesorg.*, XXXI, 161.
- Salzmann, M. '12 *Anatomie und Histologie des menschlichen Augapfels*, Leipzig u. Wien, F. Deuticke, 74.
- Simon, R. '04 *Zeitschr. f. Psychol. u. Physiol. d. Sinnesorg.*, XXXVI, 186.
- Tscherning, M. '03 *Traité de physique biologique*, Paris, Masson, 481.
- Wadsworth, O. F. '81 *Beitraege zur Ophthalmologie*, Fr. Horner gewidmet, Vide Jahresber. f. d. Fortschr. d. Anatom. u. Physiol., X, (1), 299.
- Woelfflin, E. '10 *Archiv f. Ophthalmol.*, LXXXVI, 464.

# ON THE CONJUNCTIVITIS MEIBOMIANA (ELSCHNIG).

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A report of three cases of this condition with discussion of its characteristic features.

In November of 1913 I had an opportunity to examine a patient, a man aged 63, who was suffering from a chronic conjunctivitis with thick yellowish discharge.

The conjunctivitis differed, however, evidently from any other known chronic form, especially in regard to the localization of papillary growth on the conjunctiva.

Details of the disturbances of the eyes were as follows:

The eyelids were externally slightly swollen on each side.

An examination of the conjunctiva showed immediately the origin of the above mentioned discharge.

It flowed out, by the compression on the tarsus, from somewhat swollen orifices of the Meibomian glands. These were apparently enlarged, due to their abundant contents of secretion; and could be observed as yellowish bodies through the greyish cloudy thickened conjunctiva.

In a further observation of the palpebral conjunctiva, which was now free from foamy secretions on its surface, a strong papillary growth was observed, which came most apparently to sight, if the conjunctiva was observed obliquely.

The localization of that papillary growth varied so far from the ordinary forms that it was not localized and most remarkable beyond the upper part of the tarsus; but was most intense in the neighborhood of the lid margin, diminishing gradually towards the fornix where it almost disappeared.

The disturbances of each lid were just the same in regard to their extension and intensity.

The bulbar conjunctiva was normal.

The skin of the lids, eyelashes and the roots of the latter, showed in no wise pathologic.

Some smear preparations from the discharge of the Meibomian glands were made for the sake of microscopic studies. They were obtained by means of compression on the tarsus, and stained with sudan III, haematoxylin-eosin and also after the Gram method.

The discharge consisted chiefly of solid fat containing some fatty degenerated epithelial cells of the Meibomian glands, and their ducts.

No bacteria were to be found in it.

The affection healed after three months by daily massage of the Meibomian glands, in order to remove their secretion, combined with washing with strong sublimate solution.

Three months later another case came under my observation, which might be considered as a light form of the former case, in a man aged 48 with optic atrophy.

The disturbances of the conjunctiva were not so severe as in the former case, and were limited to the left side only.

The papillary growth was localized also simply on the lower part of the tarsus, near the free margin of both lids.

Hyperemia of the conjunctiva was somewhat noticeable.

Discharge obtained from the Meibomian glands was sterile.

The two cases above described led me at that time to believe in the existence of a peculiar form of chronic conjunctivitis which is characterized by a hypersecretion of the Meibomian glands, accompanied with a specific localization of papillary growth on the conjunctiva.

I had reserved, however, the report on these cases for further experiences.

But soon after I was astonished to find a description published by Elschnig several years ago, regarding the above

mentioned form of chronic conjunctivitis, under the name of Conjunctivitis Meibomiana, of which I was until then ignorant.<sup>1</sup>

The clinical features of my two cases were so coincident with the description of Elschnig that they might be considered completely identical with the Conjunctivitis Meibomiana in Elschnig's meaning.

Some months later I saw a further case of that conjunctival affection in a man aged 24.

In this case the affection was localized on all the lids and showed its typical appearance on the palpebral conjunctiva, as already mentioned.

The discharge from the Meibomian glands was examined for microorganism but in vain.

The affection improved much by daily application of massage on the tarsus; but after three months the patient had to leave for Formosa owing to his business. The three cases above<sup>2</sup> described were reported at the time.

The essential features of the conjunctivitis Meibomiana are the typical localization and spreading of the papillary growth on the palpebral conjunctiva, and the stagnation of the secretion of the Meibomian glands, on account of hypersecretion.

This functional disturbance of the Meibomian glands seems only to have causal reference to the chronic inflam-

mation of the palpebral conjunctiva, especially most intense on the tarsal region; for the inflammation can only be subdued by daily massage of the Meibomian glands in order to remove their secretions, and without this procedure it can never be healed.

The discharge of the Meibomian glands is usually sterile, as all my cases showed; and it tells us that the conjunctival affection must be ascribed to the functional excess of the Meibomian glands but not to infection.

There may occur, however, naturally a secondary infection during the course of the affection, as was observed in a few cases by Elschnig.

It seems doubtful if the cases of Sylla<sup>3</sup>, which have been reported under the name of conjunctivitis Meibomiana, were genuine cases of the disease described by Elschnig.

They resemble rather subacute or chronic chalazion, so far as the pathogenic bacteria were found in his cases.

It seems to me that little attention is paid to the existence of this chronic form of conjunctivitis from the side of the ophthalmologist, for the reports concerning the affection are very few, so far as I can find.

This might depend naturally upon the rarity of that disease; but also upon the ignorance of it; so that I offer this short report in order to awaken a renewed interest of the specialist in this disease.

#### BIBLIOGRAPHY.

<sup>1</sup> Deutsche med. Wochenschrift, 1908. XXXIV. Jahrg. 1. Halbj. S. 1833.

<sup>2</sup> Osaka-Igakkai-Zasshi Vol. 12, 1914.

<sup>3</sup> Wochenschrift für Therapie und Hygiene des Auges. XIII. Jahrgang Nr. 18-19. 1910.



# METASTATIC ENDOPHTHALMITIS ASSOCIATED WITH EPIDEMIC CEREBRO-SPINAL MENINGITIS.

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Report of a case with microscopic examination of the eyeball. Read before the Central Texas Medical Society at Waco, January 8th, 1918.

The history of this case is presented for two reasons. First in order to make a suggestion as to treatment, and second to exhibit an histologic study of the shrunken globe which, while contributing nothing new to the pathology, corroborates in an interesting fashion many of the earlier findings.

Metastatic endophthalmitis as a complication of epidemic cerebro-spinal meningitis is said to be of frequent occurrence and to be "distinguished by its comparatively mild course." The percentage according to Knapp<sup>1</sup> being from 4 to 5. Uhthoff<sup>2</sup> also gives the percentage from 4 to 5 and states that "it is usually unilateral but that occasionally both eyes are simultaneously affected." From what I can learn from a review of recent literature I doubt very much if a careful analysis of the statistics of the epidemics occurring during the past few years in this country would show such a high percentage of metastatic endophthalmitis. As regards the statement that it is a mild process, a study of the reports of individual cases which have been described in detail, and my own experience with the present case, leads me to believe that this is one of the many inaccuracies that appear in text books and are passed on from one author to another.

Dr. Allen Greenwood<sup>3</sup> in discussion at the A. M. A. in 1913 says, "In the epidemic in Boston in 1908 it was not true. The cases of metastatic ophthalmia were extremely severe. Most of the patients with metastatic ophthalmia died, but the severity was marked. But one of the patients showing metastatic ophthalmia lived and he had phthisis bulbi in the involved eye." That these cases of purulent endophthalmitis are of metastatic origin

and not the result of direct transmission through the optic sheath has been convincingly established by the observations of Axenfeld, Mayou and others. "The organism is conveyed to the eye by the blood stream and not by a direct spread from the meninges" (Collins and Mayou).<sup>4</sup> Axenfeld<sup>5</sup> states "Till now, at least, there is no certain case known of infection of the interior of the eye from the optic sheath." Whether the site of the septic embolus is in the retina or uvea is of no practical value from a clinical standpoint, for when seen the process has usually spread to the vitreous and there is no view of the fundus to be obtained. It is interesting to note, however, that Axenfeld states that when the invasion is into the retina both eyes are affected, and when into the uvea it is unilateral.

The important facts are the mode of the invasion, and the presence of bacteria in the eye. The presence of the organism has been difficult to demonstrate for, as Axenfeld<sup>5</sup> states, "Meningococci in the infected eye rapidly die out and when the eye is available for examination they can no longer be demonstrated." He says, "However their presence has been definitely proved in cases." Lt. A. L. Weakley, R. A. M. C.,<sup>6</sup> in the British Medical Journal, January 8th, 1916, reports a case of metastatic endophthalmitis accompanying epidemic cerebrospinal meningitis in which hypopyon was present and paracentesis was performed. A pure culture of gram negative diplococci was grown from the pus removed. Hanford McKee<sup>1</sup> in the Ophthalmic Record, Sept., 1908, mentions a culture of gram negative diplococci grown from the pus in the anterior chamber of the eye of a child dead

of epidemic cerebro-spinal meningitis which organisms coincided in all particulars with the gram negative diplococci isolated from the child's cerebro-spinal fluid, meningococci.

In spite of the fact that metastatic endophthalmitis of meningococcic origin is spoken of by authoritative writers as a mild process, these cases nearly always go on to atrophy of the eye and occasionally there is rupture of the globe.

had been unusually severe and he was covered with hemorrhagic spots, many of which were confluent. It was the fourth day since the disease had been recognized. He was conscious and his general condition was very good. Meningococci had been found in the spinal fluid and the blood.

Upon examination I found the right eyelids swollen, the episcleral tissue injected giving the globe a dull lilac hue. The cornea was faintly hazy, the pupil

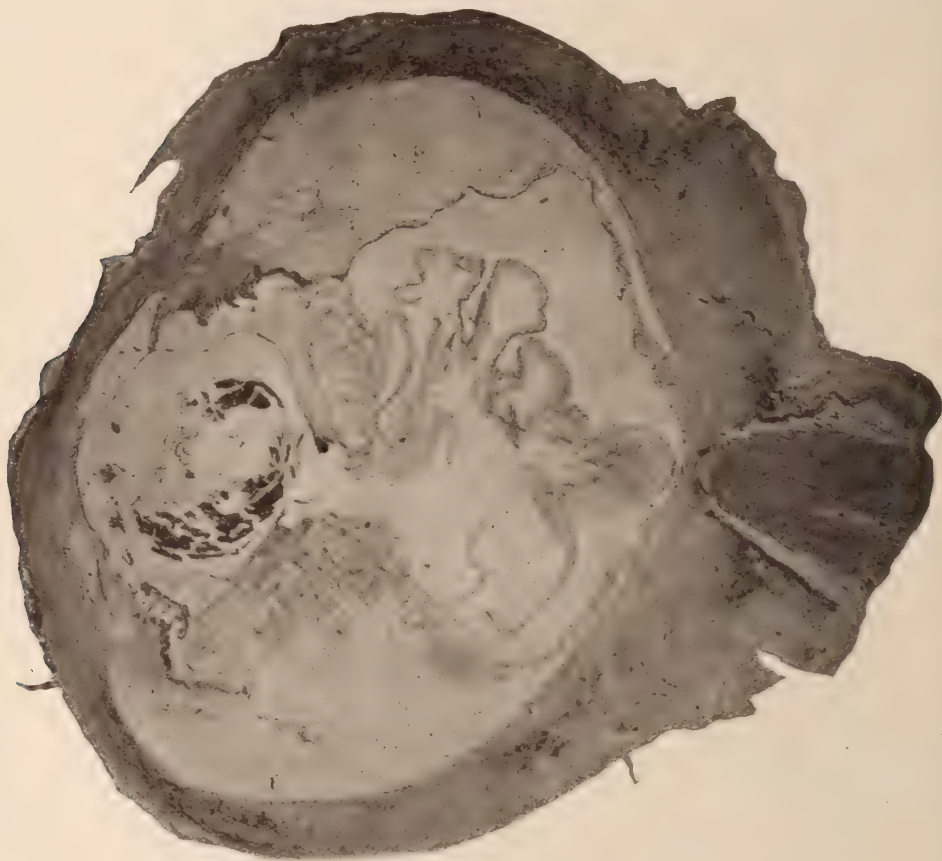


FIG. 1.

Section of whole eye showing unequal thickening of sclera and cornea. Fusiform swelling of retina, optic nerve, and sheaths. Stained hematoxylin and eosin.

#### REPORT OF A CASE.

April 27th, 1917, I was called in consultation by Dr. William Gammon to see the eye of a boy 17 years of age, who was suffering from epidemic cerebro-spinal meningitis. The attack

measured 4 mm. and the iris responded sluggishly to light. Through the pupil was seen a white mass behind the lens. Vision equal light perception.

The left eye presented no abnormal change.



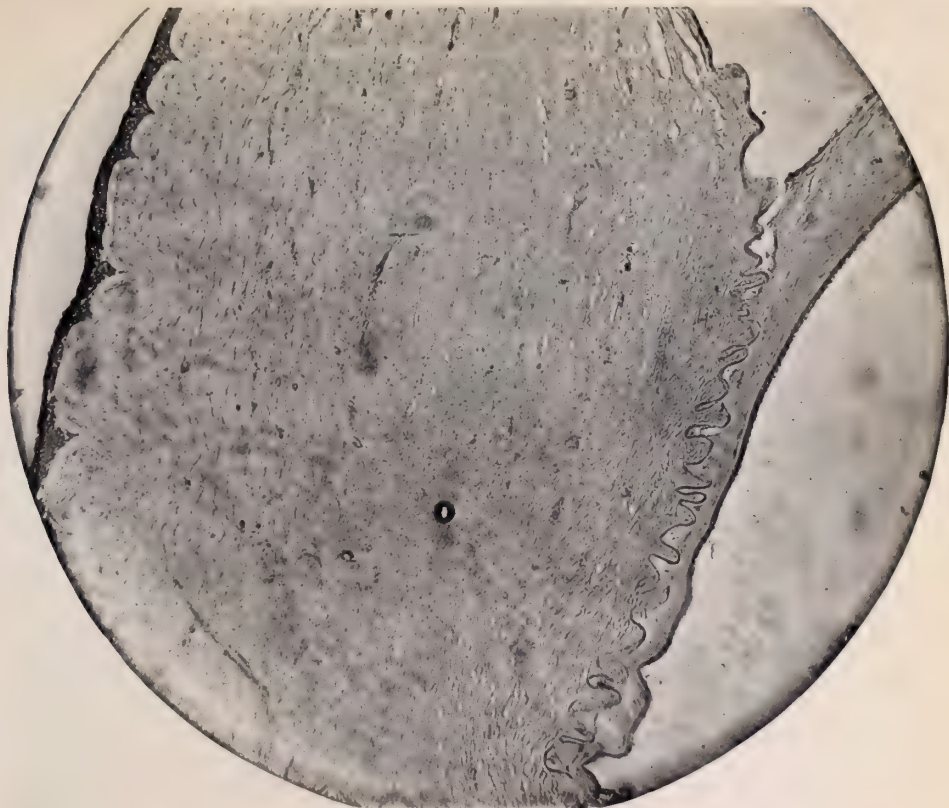


FIG. 2.—DESCEMET'S MEMBRANE THROWN INTO FOLDS. POSTERIOR TO CORNEA IS SEEN LAYER OF EXUDATE FROM IRIS, TO WHICH IS ATTACHED LENS CAPSULE. LENS EPITHELIUM IS SEEN ATTACHED TO CAPSULE. STAIN, HEMATOXYLIN AND EOSIN.

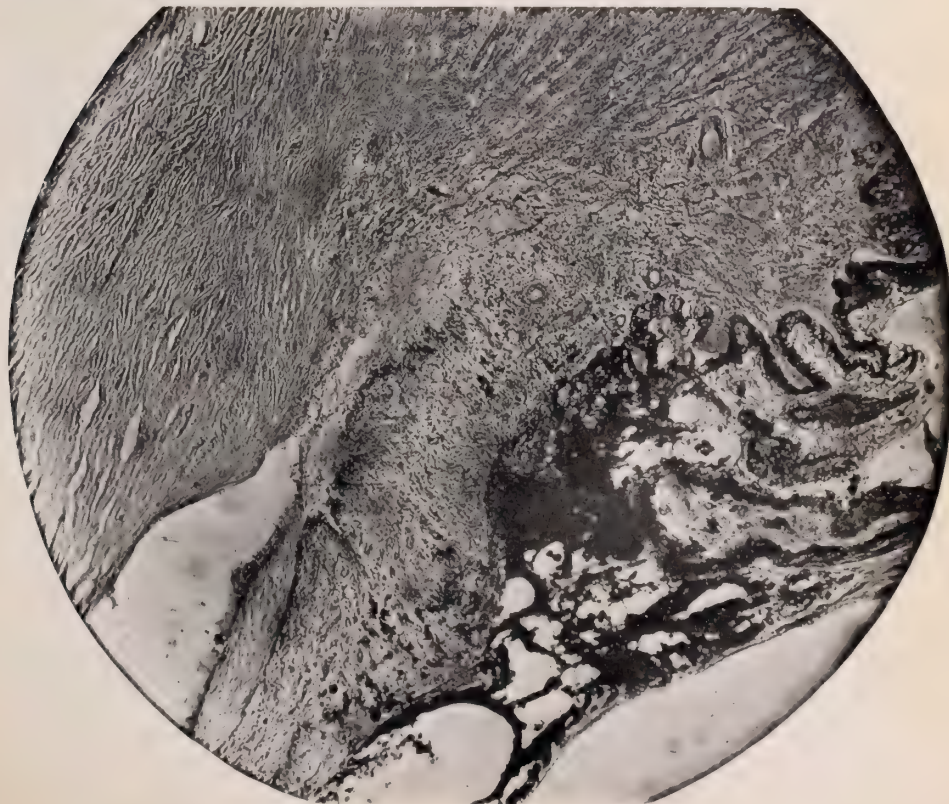


FIG 3 —CILIARY BODY AND PROCESSES. STAIN, HEMATOXYLIN AND EOSIN.





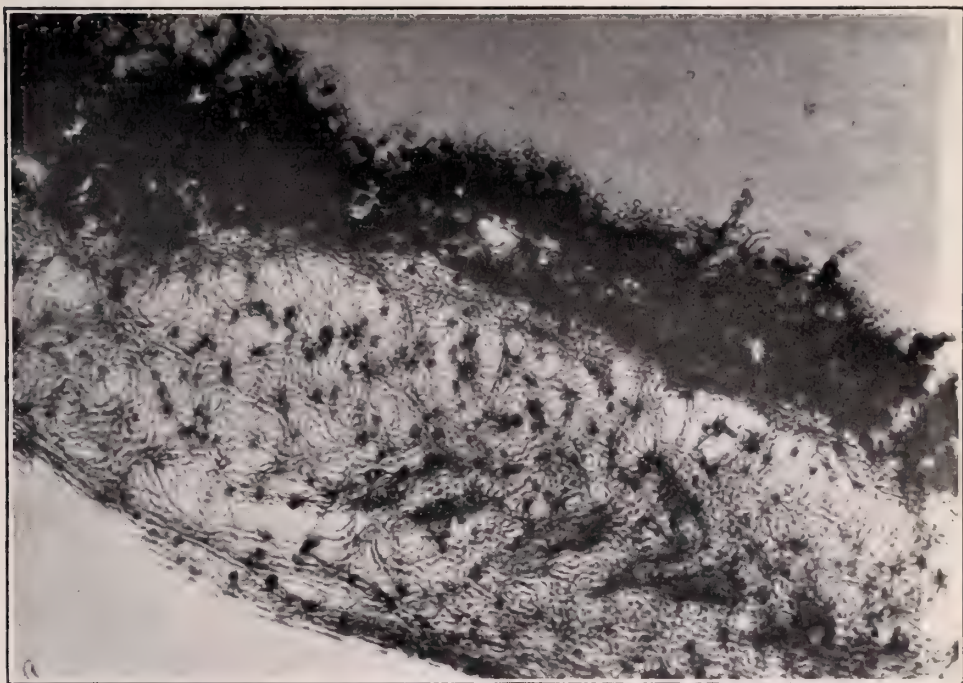


FIG. 4.—RETINA. STAIN, HEMATOXYLIN AND IRON

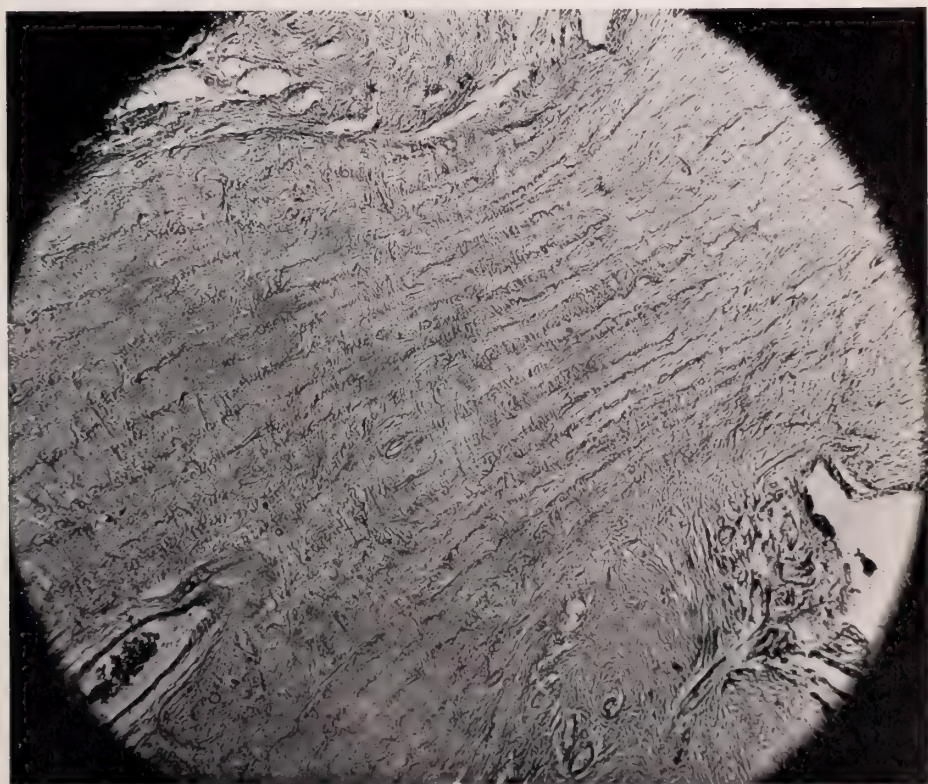
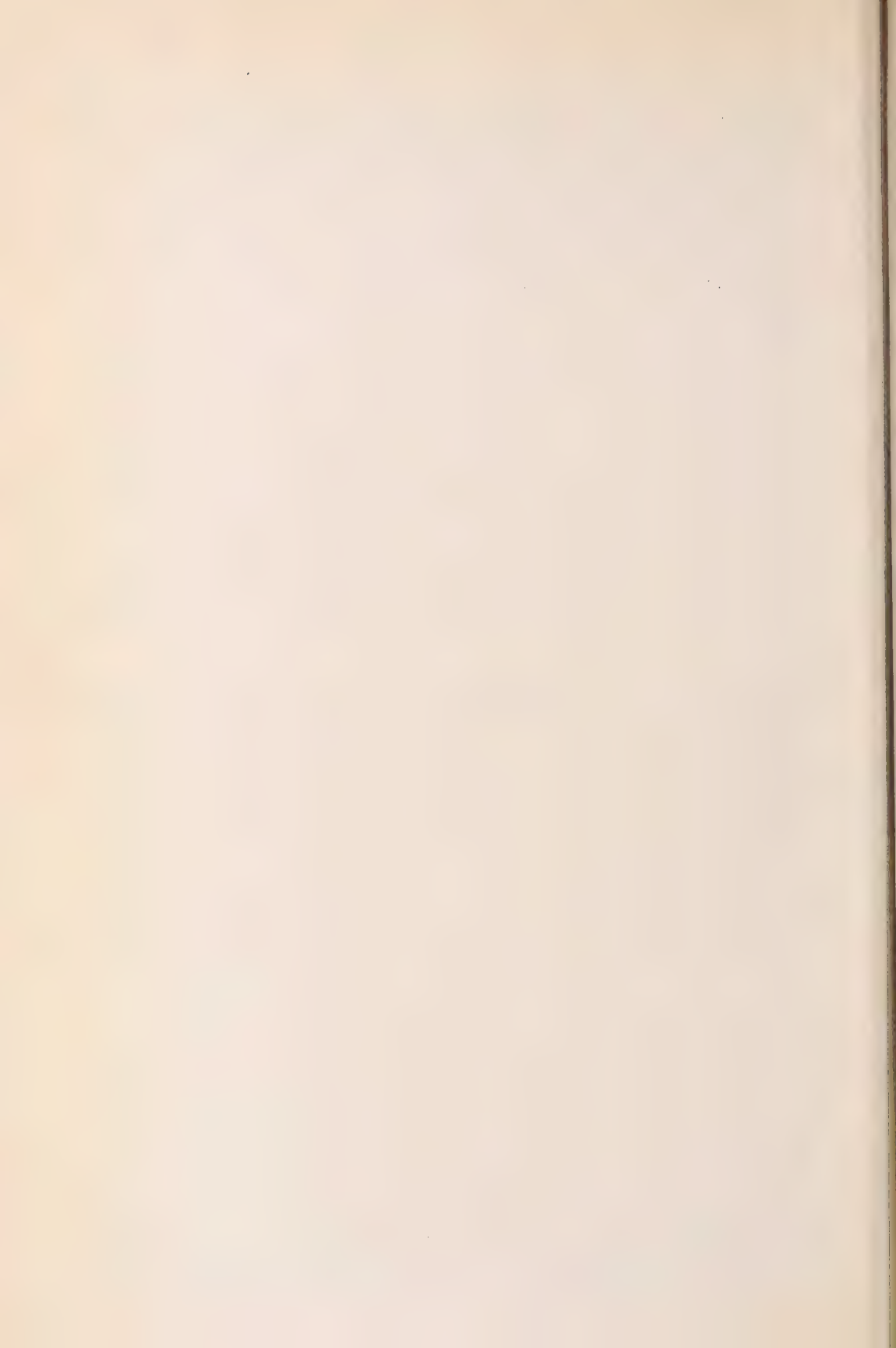


FIG. 5.—OPTIC NERVE AT ENTRANCE TO EYEBALL. STAIN, HEMATOXYLIN AND EOSIN.





Atropin was instilled into the right eye. The following day the cornea was quite hazy, the anterior chamber contained pus and the white mass in the vitreous was well seen through a widely dilated pupil. Photophobia was severe and there was active lacrimation. He had had six injections intraspinally of 20 cc. each of Mulford serum, and the spinal fluid was now clear and free from organisms.

On April 28th the condition of the eye was much worse and it seemed to be going on rapidly to destruction. He was now given intravenous injections of the serum. Two injections daily of 20 cc. each were given for three days. The day following the first injection the eye was somewhat clearer. On the second day the cornea had cleared and the anterior chamber was free from pus. The globe had lost the sickly lilac hue, and had become bright red, showing that an active effort was being made on the part of the tissues to rid the eye of the invasion. The day following, the third day of intravenous injections, the eye showed still more marked improvement and the white mass in the vitreous had receded some distance and movements of the hand could be seen.

He now developed a serum reaction and it was necessary to discontinue the injections. During the next few weeks his general health improved rapidly but the eye remained the same. Atropin was continued and the eye protected from the light. Finally the eye began to shrink and at the end of six months had become very small and disfiguring. Altho the eye was now quiet the patient desired for cosmetic reasons to have it removed. On November 20th, 1917, the eye was enucleated. The capsule of Tenon, muscles and sclera were matted together, making careful dissection necessary in their separation, in spite of which he has an excellent stump.

The rapidity and degree of the improvement was so great following the intravenous injections, that I am fain to believe that had they been given at the first sign of involvement of the eye,

that the process might have been stopped before great changes had taken place and the eye saved. The purpose of this report is to suggest that intravenous injections of serum be given at the first suggestion of eye complication and before as a preventive measure in those cases accompanied by numerous hemorrhages into the skin.

#### DESCRIPTION OF THE GLOBE.

Diameters: Sagittal 19 mm. Transverse 19.5 mm. The sclera shows great thickening, measuring 4 mm. near the posterior pole and tapering to 1.5 mm. near its anterior extremity. The cornea is opaque, the lens partially absorbed and the retina completely detached and presenting a fusiform appearance near the optic nerve entrance. See Fig. 1.

Microscopic appearances: In some sections the corneal epithelium is represented by a thick layer of modified epithelial cells. In others it is absent, and is replaced by a layer of fibrous tissue, which is connected with Bowman's membrane by a series of fibres perpendicular to it, placed at comparatively regular intervals producing a reticular arrangement. Bowman's membrane is fairly well preserved and presents a wavy outline dipping down into the substantia propria. The substantia propria has been converted into an irregular mass of fibrous tissue through which course many blood vessels. There are scattered throughout fixed cells, and what appear to be corneal spaces.

Descemet's membrane is preserved in its entire extent, which, on account of the shrinking of the other portions of the eye, has caused it to be thrown into many folds. Its endothelial lining remains as an irregular row of cells. Immediately behind the endothelial layer of the cornea there is a dense mass of exudate proceeding from the iris, and attached to the posterior surface of this exudate is the lens capsule with the lens epithelium attached. See Plate XII, Fig. 2. The capsule when traced around is seen to be broken posteriorly and occupied by a much shrunken and partly absorbed lens. In the lens

near the equator are numbers of leucocytes.

The angle of the anterior chamber is in part obliterated, by adhesions between the iris near its base and the cornea. The ciliary body and processes are fairly well preserved but show a great deal of round cell infiltration. See Plate XII, Fig. 3. The choroid is little changed but is separated from the sclera except at the optic disk.

Immediately posterior to the lens capsule is an area of inflammatory exudate, in which there is a large mass of round cells and to which is attached the retina. (Fig. 1.) It was here that the white mass was located that was seen through the pupil shortly after the eye became inflamed, and it suggests that the septic embolus may have lodged in the anterior part of the retina and pus developed at this place in the vitreous. The retina is completely detached and disorganized. See Plate XIII,

Fig. 4. There are places in which parallel rows of densely stained nuclei are seen, which are probably the remains of the nuclear layers. As the optic nerve is approached the fusiform mass seen by low magnification is seen to be composed of fine fibres which are continuous with the fibres of the optic nerve. Their arrangement does not appear to be the result of papillitis but more that of a drawing forward of the fibres associated with the inflammatory changes in the retina. The retrobulbar portion of the nerve shows well marked degeneration. The optic nerve sheathes and intervaginal space are apparently normal. Plate XIII, Fig. 5.

My thanks are due to Dr. Henry Hartman of the Department of Pathology of the University of Texas for the preparation of the specimens and to Dr. William Keiller, Professor of Anatomy, for assistance in their study.

#### BIBLIOGRAPHY.

1. The Cultivation of the Meningococcus from Eye Conditions Complicating Epidemic Cerebro-spinal Meningitis. By Hanford McKee, B. A., M. D., Ophthalmic Record, September, 1908.
2. American Encyclopedia of Ophthalmology. Vol. III, pg. 1974.
3. Trans. A. M. A. Ophthalmic Section. 1913, p. 178.
4. Pathology and Bacteriology of the Eye. 1911. Collins and Mayou.
5. Bacteriology of the Eye. Dr. Theodore Axenfeld. 1908.
6. Metastatic Endophthalmitis. By Lt. A. L. Weakley, R. A. M. C. British Medical Journal, January 8th, 1916.
7. Clinical and Histological Report of a Case of Purulent Metastatic Ophthalmia in Meningitis, Giving Rise to Meningitic and Sympathetic Symptoms After Thirteen Years. Enucleation. Recovery. By Dr. C. Zimmermann and Dr. Brown Pusey. Annals of Ophthalmology. 1903. Vol. XII, p. 446.

### QUININ POISONING, ITS OCULAR LESIONS AND VISUAL DISTURBANCES.

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This analytic review of the literature of the subject combined with the personal experience and conclusions of its author constitutes a clear statement of our present knowledge of the subject. It is of especial practical value at this time.

*Concluded, with bibliography.*

#### THE PATHOLOGY OF QUININ POISONING.

One of the earliest, if not actually the very earliest, of the communications on this subject is that by Brunner (1882), who discussed the mechanism of quinin blindness and suggested

the following possibilities: (1) That the alkaloid in the blood directly attacks the end organs of the retina; (2) that the retina is starved owing to the ischemia; (3) that the optic nerve is primarily attacked; (4) that the blind-

ness is due to gross lesions, either inflammatory or hemorrhagic; (5) that the primary lesion is cerebral in origin. After a careful consideration of the question, he came to the conclusion that the seat of the lesion was a peripheral one, and that the amaurosis was dependent upon the retinal ischemia, the inflammatory changes of the retina might play a secondary part. Ten years later, de Schweinitz experimented on the same lines (without knowledge of Brunner's work), and carried the matter still further by producing quinin blindness in dogs, and submitting the brain and eyes of the animals to careful anatomic examination. In the main, he confirmed Brunner's findings, but was disposed at the time to lay some stress on inflammatory changes in the walls of the vessels of the optic nerve. He thought that the vasoconstriction was due to the action of the quinin upon the vasomotor centres, and he drew special attention to the selective action of this drug upon the special sense organs of sight and hearing.

About the same time (1891) Barabachew made a contribution to the subject which was as venturesome as it was interesting, since his experiments were made on human beings. With doses of 0.3 to 0.6 grms of quinin, he found no observable results in sound subjects free from idiosyncrasy; 1.2 grms produced annoying symptoms, though not the same in all cases; 2.4 to 3.6 grms doses resulted in the appearance of marked symptoms, analogous to those of severe quinin amaurosis; these included all the classic signs of the condition. He was able to draw an early clinical picture of extreme interest, and one which for obvious reasons has evaded the attention of the practicing clinician. Its leading features are as follows: (1) There is an increase of visual acuity following the dose and lasting for some hours; (2) there is an early constriction of the pupil, which lasts only a short time and then passes into dilatation; (3) the pulse at first is rapid, later it is slow; (4) the sensibility of the cornea is first increased and subse-

quently diminished; (5) there is an early slight rise of temperature followed by the usual fall. In one case, there was amaurosis for half a minute, which returned ten times after intervals of from 5 to 10 minutes, the sight being normal in between the attacks. Each attack of visual disturbance was attended by a constriction of the visual field. An irregularity of the heart and pulse accompanied these changes and suggested an affection of the vasomotor system. He raised the question whether the contraction of the retinal vessels was a central vasomotor action, or was due to the direct influence of the quinin, circulating in the blood, on the vessel walls. He attributed the contraction of the visual fields, to the diminished supply of blood to the peripheral parts of the retina, and to the consequent loss of functional activity in those regions.

Behse injected bichlorid of quinin into animals subcutaneously and found pallor of the optic disc and contraction of the retinal vessels; he was struck by the fact that the dose required to produce toxic symptoms differs as widely in animals as it does in man. He described changes in the coats of the vessels, and thrombosis of the retinal artery amongst other phenomena, which he encountered. He thought that the primary change was a spasm of the vessel walls, followed later by organic alterations, associated with permanent loss of vision.

A new note was struck by de Bono (1894), who made a number of experiments on frogs. In these animals, there is, under normal conditions, a movement of the pigment granules in the retinal epithelium, as a result of the stimulus of light. De Bono found that if a toxic dose of quinin were first administered by injection, this normal response to the light-stimulus was abolished; he concluded, therefore, that the cells themselves had been directly poisoned by the drug, and proceeding to apply his results to human beings, he deduced that the cause of the amaurosis was not to be sought in the ischemia present, but in the quinin intoxication of the terminal elements of



the optic nerve in the retina, viz., the rods and cones. He farther pointed out that, inasmuch as the ischemia may and often does persist, long after the return of vision, it is not reasonable to attribute the blindness wholly to it.

De Schweinitz, in 1896, brought out his classic volume on "Toxic Amblyopias," in the course of which he discussed the pathology of quinin poisoning at length. Again, in his remarks on Holden's paper, he gave it as his opinion that the ischemia of the retina was due to the action on the vessel walls of the quinin circulating in the blood.

This brings us to the valuable paper by Ward A. Holden (1897-98), who examined the fresh retinas of quinin poisoned dogs under Nissl's methylene-blue and eosin, and the optic nerves of the same animals by the Marchi osmic-acid staining method. He concluded (1) that the pathologic process was one of degeneration of the nerve fibre and ganglion cell layers of the retina, due to insufficient nutrition determined by the constriction of the retinal arteries; and (2) that this degeneration was followed by an ascending atrophy of the optic nerve fibres, which extended up to their terminations in the external geniculate body and pulvinar of the thalamus. He found no lesions in the other layers of the retina. To his mind the blindness could be satisfactorily explained by the indirect action of the quinin in producing spasm of the retinal vessels, and thus diminishing the nutritive supply of the inner layers, and he questioned any direct toxic influence on the nervous elements.

The next land-mark in the literature of the subject is Birch-Hirschfeld's paper in 1900. He found that the doses, which were on record as producing quinin amblyopia, varied from 0.75 grms up to 30 grms. He thought that Holden's findings of changes in the ganglion cells were not wholly correct, and that an element of confusion had been introduced into them by post mortem changes. His examination showed the following alterations in the cells of the retina: The ganglion cells

were shrunken; their boundaries were indistinct; the protoplasm stained deeper than normally with thionin; vacuolation was present, and there were changes in the chromatin bodies, as well as in the nuclei and nucleoli. The inner granular layer showed similar changes, and so did the outer granular layer, but they were less marked in the latter than in the former. The rods and cones were degenerate. There were no changes (endovascular or thrombotic) in the retinal vessels. He conducted experiments by merely cutting off the vascular supply of the retina by surgical means, and compared the results obtained with those following the ischemia of quinin poisoning. The vacuolation of the retinal cells was much less marked in the former than in the latter eyes. On the other hand, the artificial and purely traumatic interference with the blood supply produced much more shrinkage of the cells and of their nuclei than the quinin toxemia did; otherwise the changes were alike in both. He considered that the differences he observed and described were sufficient to indicate that another factor beside retinal starvation entered into the case. In confirmation of this view, he pointed out that it is in accord with what we know of the clinical aspect of quinin poisoning, in its selective action on the special sense organs. Changes in the optic nerve were only observed at a later date and were, in his opinion, merely secondary; he used Marchi's method in his examination of the nerve fibres.

These experiments were criticised in their turn by Druelt (1900), who controlled them by a similar series on quinin-poisoned animals. He found that the primary changes were situated in the ganglion cells, and particularly in those at the periphery of the retina, and he believed that the degeneration in them was due to the direct action of the quinin on the cellular elements, and not primarily to the malnutrition brought about by the ischemia. His argument that the preservation of the fibres, which supply the centre of the retina, can hardly be explained on

the theory of vascular spasm, is one whose validity many will challenge; for any influence, which lowers the total blood supply to the retina, will surely be most felt at the periphery, where the pressure is normally lowest, and least felt at the centre, where it is highest. Drualt's main criticism of Birch-Hirschfeld's technic is on the ground that rabbits are unsuitable subjects for such investigations, since changes are very easily produced in sections of their retina by slight modifications of the method used. Drualt, Abelsdorff and Nuel have all failed to find the changes, which Birch-Hirschfeld described as occurring in the nuclear layers of the retina.

So much for the experimental work that has been done on the subject. We have seen that there are two schools of thought, one of which ascribes quinin blindness to starvation of the retina as a result of the ischemia produced, and the other believes that there is a selective toxic action of the drug on the cells of the retina. Some additional light is thrown on the case by an examination of the clinical records, and by a consideration of certain features of the toxic amblyopias which follow the action of other poisons.

Mention has already been made of cases in which patients have described the extinction of their sight as occurring with dramatic suddenness, and attention has been drawn to Barabaschew's extraordinarily interesting case, in which amaurosis lasted half a minute, and returned 10 times at intervals of from 5 to 10 minutes, the sight being normal between the attacks. It would appear certain that spasmodic vasomotor constriction plays an important part in these cases. Other facts which point in the same direction are: (1) Parker observed the columns of blood presenting a broken appearance in the retinal vessels of his case. (2) Stasinski met with a case of quinin amaurosis, in which vision improved when the patient lay down, and diminished when he sat up. (3) Zanotti had a girl under quinin treatment whose sight suffered each time that a dose of .75 cg. of quinin was given her; at the

same time, her discs paled and her retinal arteries narrowed; and (4) the writer has recently met with the same sequence of events after a very small dose of quinin in a highly susceptible patient. It would hardly be safe in these two latter cases to argue that the loss of vision was due to the ischemia. They might both be effects of some common cause.

There is, however, a very strong argument against the view that the blindness of quinin poisoning is due to retinal ischemia, and it is to be found in the fact that there are a number of cases on record, in which the retinal vessels were either normal in appearance, or at the most were only slightly contracted, at a time when absolute amaurosis, with wide dilatation of the pupil, had been definitely established. The earliest of such were two reported by von Graefe; since then, others have been recorded by Ballantyne, Browne, Buller, Webster Fox, Garofolo, Jodko, Kaz, Muntedam and Williams. Attempts have been made to discredit this evidence, but it is obviously impossible to explain away so considerable a number of observations made by such reliable and distinguished surgeons, even were they not supported by experiments on animals, as indeed they have been; for, de Schweinitz records a very similar experience in a dog blinded by a dose of quinin, given the previous day. In this animal there was no evident change in the colour of the discs, or in the calibre of the veins; the arteries were smaller than they had been, but their shrinkage was very gradual, and took 21 days to its complete accomplishment; during the whole of this period, the animal was totally blind. Nor was this experience an isolated one, for the same author remarks in a foot-note that "occasionally in dogs, altho the blindness is complete, the shrinkage of the vessels does not occur till some days afterwards." Ballantyne has further pointed out that even in ordinary typical cases, there is no close connection between the degree of ischemia and the state of the vision, and that one of the most striking phenomena of quinin pois-



oning is the recovery of vision at a time when the optic discs are becoming paler and paler, and when the attenuation of the retinal vessels is becoming more pronounced. We must not forget, however, that at a still later stage of months or even years afterwards, the gradual and permanent restoration of vision is accompanied by some measure of visible increase of the retinal circulation. It would be well to avoid laying too much stress on this latter argument; nor should we overemphasize the value of the opposing evidence furnished by Hobby's case, in which, with marked ischemia of both retinæ, the vision of the right eye was 0.50, whilst that of the left was only 0.03. In a few days both recovered vision of 0.80. The inequality of the visual power, coincident with the bilateral ischemia, is striking, and would be convincing if we could only be sure that the constriction of the retinal vessels was the same in both eyes; unfortunately we cannot.

Yet another argument is furnished by W. W. Gray, and endorsed by de Schweinitz, for whom he was working. It is that "tho the original effect (of quinin on the eye) is in some sense due to the influence of this drug on the vasomotor centres, this cannot be the entire explanation, or we should have similar actions under the influence of well-known vasomotor stimulants like ergot." De Schweinitz describes the signs of ergot poisoning as follows: Wide dilatation of the pupil, blanching of the optic discs and contraction of the retinal vessels.

Whilst the signs and symptoms of quinin poisoning closely ally the action of the drug with that of the many other toxic substances which produce amblyopia, there are distinct features which stamp this toxemia as specific. These are: (1) The absolute completeness of loss of all vision, sometimes coming on quite suddenly; (2) the extraordinary recovery of function which may subsequently occur; (3) the fact that the central vision comes back first, and that the peripheral vision is recovered more slowly and seldom, if ever, completely; (4) that the color sense is often damaged, but that if it returns, it does so first at the centre, and then works gradually outwards; (5) that a diminution of the light

sense, with resultant night-blindness, is a frequent, if not an invariable sequence of these cases. No such syndrome occurs in any other form of toxic amblyopia; moreover, as de Schweinitz showed, each of the poisonous drugs, which affect vision, produces more or less specific results of its own, thus suggesting that each acts on definite structural elements, and in a specific manner. Ballantyne suggested the possibility that quinin acts selectively on the rods, and he considered that the night blindness, so often complained of in these cases, supports this view. Ingenious as the suggestion is, the evidence on which it is based is somewhat sketchy. The weight of the latter would undoubtedly favor the view, that in dealing with quinin amaurosis, we have to do with a specific toxemia, a feature of which is a powerful selective action. As to the precise nature of the structure selected, we are not yet in a position to pass a final judgment. It is obvious that when a retina, or indeed any other organ, is suffering from the effects of a powerful intoxication, the cutting off of its blood supply may become a very important and even a dominating factor in the situation. In other words, the ischemia is not the primary, or the principal cause of the amaurosis, but it is none the less an influence of the gravest possible import and one which we must never omit from our calculations.

Before closing the subject, a word should be said on the parallel that has been drawn between quinin amaurosis and that occurring after hemorrhage. Surgeons have written and spoken, as though the two conditions were indistinguishable from each other, if not identical. Webster Fox has ably dealt with this matter, and has laid the myth to which we have referred. In 106 cases of blindness following hemorrhage, he found that the clinical picture of a pure ischemia without inflammatory changes was invariably absent; restitution of normal central vision did not occur; nor was the syndrome of sudden deafness and blindness ever observed as a result of a severe hemorrhage. Dealing with this subject, Fuchs gives acute anemia, after great loss of blood, as a cause of optic



neuritis, and he states that hemorrhage from the stomach and uterus are the most frequent causes of the condition; the blindness does not set in until some days after the hemorrhage and is generally incurable.

#### TREATMENT.

The first and most obvious indication in the treatment of quinin poisoning is to stop the supply of the drug. There is, however, a tendency amongst a certain school of practitioners to argue that blindness is preferable to death, and that therefore the treatment of malaria will sometimes demand the sacrifice of sight in order to save life. Those who adopt such a position must see to it that their diagnosis is correct, and that the symptoms, which they ascribe to malaria, such as vomiting, headache, delirium and coma, may not in reality be manifestations of quinin poisoning. They must also satisfy their colleagues, that there is no method of effectually treating severe cases of malaria other than the exhibition of the large doses of quinin which they advocate. The writer does not attempt to dogmatise on the latter subject, but he is skeptical as to the favorable reception of such a view by those who have had large experience in the treatment of tropical diseases.

Once a patient is known to have an idiosyncrasy for quinin, or to have suffered from poisoning by this drug on some previous occasion, it is advisable to avoid the exhibition of any of the cinchona products, if possible. It has already been pointed out that in the experience of de Schweinitz, Knapp, Nettleship and others, patients, who have already suffered from poisoning by large doses of the drug, are liable to be adversely affected on subsequent occasions by comparatively small ones. Manolescu, not merely lays great stress upon this point, but urges that the greatest care should be taken in the use, under such circumstances, of any product, which is known to be liable to bring about any form of toxic amblyopia. The lesson he teaches is strongly reinforced by Schwabe's experience, which we have already quoted at length.

We pass now from negative to positive measures, and shall deal first with the drugs which have been recommended by different writers. By far the most popular of all these is strychnin (Baldwin, de Schweinitz, Jodko, Kirkpatrick, Parker, Reina, Weeks and others). De Schweinitz ascribes its value to direct stimulation of the optic nerve fibres, but it seems possible that this may not be the whole cause of its favourable influence. It is said to prove more satisfactory when injected subcutaneously.

We come next to the drugs which favour vasodilatation, and of these, nitrit of amyl has been the most favoured (Baldwin, Kirkpatrick, Parker, Reina, Weeks and others), whilst nitroglycerin has had only one advocate (Parker). This is the more incomprehensible since the action of the former drug is well-known to be very transient, whilst that of the latter is slower and more lasting. One would have thought that these characteristics would have recommended nitroglycerin. It may be mentioned that Parker combined the two, giving 2 minims of nitrit of amyl thrice daily, together with 1-75th grain of nitroglycerin every 4 hours. Digitalis has appealed to a number of the writers (Buller, de Gouvea, Gruening, Tiffany, Weeks) presumably because it increases the force of the heart beats. The bromides and iodides have both been called into requisition, but do not appear to have attained to any great popularity. Webster Fox, however, claims to have obtained great improvement under treatment of a severe case with hydrobromic acid. He gave 15 minims thrice daily to a boy of 13, who had been given large doses of sulphat of quinin for a long period. In a case with high tension Tiffany used eserine, not unmindful of the advantage obtained by its action on a dilated pupil.

So much for drugs. We may now pass on to other measures. Reina used massage, presumably because the appearances present sometimes resemble those of embolism. It is doubtful whether such a proceeding is of the least value, the more so as it appears to be founded on a mistaken view of the pathology of the complaint. Galvanism has been recommended by Weeks and Buller. Its value, too, is

questionable. Kirkpatrick employed Bier's suction-glass. Weeks and Baldwin have suggested keeping the patient recumbent. This recommendation is supported by Stasinski's case already mentioned, in which the vision of a quinin-poisoned patient improved each time he lay down, and diminished when he sat up.

Lastly we come to the general management of the patient. Von Graefe's recommendation in favour of bleeding has deservedly met with universal condemnation. Weeks sums up the indications as follows: The relief and prevention of vascular constriction by the use of drugs, etc.; the adoption of vigorous supporting measures inclusive of a generous diet and plenty of fresh air; the insistence on the recumbent position with the head low for the first ten days, in order to favour a freer flow of blood through the retinal and choroidal vessels. It remains only to mention Manolescu's jeremiad, in which he claims to have tried every possible measure in turn and to have found all equally useless.

*Operative treatment.* The writer desires to put forward a tentative suggestion for the consideration of ophthalmic surgeons. There can be no question that the constriction of the retinal vessels plays an important part in the pathology of quinin amaurosis. A recognition of this fact has led ophthalmic surgeons to employ such drugs as nitrit of amyl and nitroglycerin. If the intraocular pressure could be permanently reduced by operative measures from normal to subnormal limits, it seems reasonable to suppose that the flow of blood through the eye would be increased; under these circumstances, an improvement in retinal function might be anticipated. It was on

such lines as these that Mayou recommended sclero-corneal trephining in the treatment of retinitis pigmentosa. The same operation seems worthy of trial in some of the permanent cases of quinin amaurosis, in which the visual defects are associated with the ophthalmoscopic signs of severe constriction of the retinal vessels. The way in which contracted visual fields have been found to improve, even after the lapse of years, would seem to indicate that something might be done in very late cases.

#### POISONING BY ETHYLHYDROCUPREIN.

Ethylhydrocuprein Hydrochlorid (syn. Optochin) is spoken of by Morgenroth, as if it were a quinin preparation. Martindale and Westcott give its formula, as  $C_{21}H_{28}N_2O_2HCl$ . It would seem to be a very dangerous drug, when administered internally. On account of its destructive power on pneumococci, it has been recommended in the treatment of pneumonia, though in this field it has belied its promise, since it has failed to check the disease. On open surfaces, where it can get at the organisms, it has proved of much more value. The indictment against its internal administration is not merely that it is useless, inasmuch as the drug fails for some reason to reach or to destroy the pneumococci, but that it is extraordinarily liable to produce a type of amaurosis, closely resembling that following the ingestion of poisonous doses of the salts of quinin. This toxic action follows the use of relatively small doses of optochin, and occurs in a much larger percentage of the patients than is the case with quinin. Cases of optochin blindness have been recorded by Adler, Oliver, Fränkel, Weeks, Scheel, Uhthoff and Feilchenfeld.

#### BIBLIOGRAPHY.

- Adler. Jour. of Amer. Med. Assoc., lxvii, p. 1236.  
 Atkinson, I. E. Jour. Amer. Med. Assoc., Chicago, 1889, xiii, pp. 433-441.  
 Atland. Klin. M. f. Augenh., 1904, Bd. ii, p. 1.  
 Ayres, S. C. Amer. Jour. of Ophth., Jan. 1897, p. 13.  
 Baldwin, W. O. Amer. Jour. of Med. Sciences, Phila., 1847; and Med. Times and Gaz., 1847.  
 Barabashew, P. Arch. f. Augenh., Wiesbaden, 1891.  
 Baumgarten. St. Louis Courier Med., Nov. 1880.  
 Behse, T. Ann. d'Ocul., cxlii.  
 Beraudi, L. Annali Universali de Medicina. Milano, 1829, Vol. lii.  
 Berger, E. "Les Maladies des Yeux," Paris, 1892.  
 Beydler. Schmidt's Jahrbuch, xviii, 1838.

- Briquet. Bull. de l'Acad. Roy. de Med., Paris, 1842-43, viii.
- Briquet, P. "Traité thérapeutique du quinquina," Paris, 1855.
- Browne, E. A. Trans. O. S. of U. K., 1887, vii.
- Brunner, H. Inaug. Diss., Zürich, 1882.
- Bruns, H. D. New Orleans Med. and Surg. Jour., 1888; and The Amer. Jour. of Ophth., Jan., 1897.
- Buller, F. Trans. of Amer. Ophthal. Soc., 1881.
- Calderai. Bolletín d'ocul., 1893.
- Calhoun, A. W. The Ophth. Rec., 1897, Vol. vi.
- Cargill, L. V. Trans. of O. S. of U. K., xxix, 1909.
- Championnière. Quoted by Galezowski (see reference).
- Claiborne, J. H. N. Y. Med Jour., 1894, lix, pt. 1.
- Conner, L. A. Med. Record, April 4th, 1903.
- Davis, W. T. Southern Med. Jour., ix, p. 769.
- De Bono, T. P. Arch. di ottal., Palermo, 1894.
- De Gouvea. Ann. d'Oculistique, Paris, 1894, cxi.
- De Schweinitz, G. E. "Toxic Amblyopias," Phila., 1896; Trans. Coll. of Phys., Phila., Nov. 1890; Ophthalmic Review, x, 1891; Trans. Amer. Ophthal. Soc., 1891; Norris & Oliver's System of Diseases of the Eye, 1900; Arch. of Ophth., xxxix, 1911.
- De Wecker. "Ocular Therapeutics." (Trans. by Forbes) London, 1879.
- Dewey, G. M. Trans. Med. Assoc. of Missouri, 1882.
- Dickinson, W. St. Louis Med. and Surg. Jour., xli, 1881.
- Diez. La Ophthalmologie Tractica, Madrid, 1883.
- Doyne, R. W. Trans. of O. S. of U. K., vii, 1887.
- Druault. Trans. of Heidelberg Congress, 1900; and Arch. d'Ophthal., 1902.
- Feilchenfeld, W. Annals of Ophthalmology, xxv, p. 596.
- Fox, L. Webster. Amer. Jour. of Ophth., vol. I, 1884.
- Fortunati. Rivista Italiana di Ottalmologia, Gennaio, 1905.
- Fränkel. Quoted by Feilchenfeld, loc. cit.
- Galezowski. "Les Amblyopies Toxiques," Paris, 1878.
- Garofolo, I. Wiener medicinische Blätter, Vienna, 1890.
- Geschwind, H. Arch. de Méd. et Pharm. Mil., Paris, 1892.
- Giacomini, G. Annali Universali di Med., Milan, 1841.
- Gimlette, J. D. The Lancet, Jan. 17th, 1914.
- Gray, W. W. De Schweinitz' "Toxic Amblyopias."
- Gruening, E. Arch. of Ophthal., N. Y., 1881; Arch. f. Augenh., Wiesbaden, 1881-2; Trans. Amer. Ophthal. Soc., Boston, 1887.
- Guersant. "Dictionnaire de Médecine," Paris, 1842.
- Hamlich, H. Wiener klin. Rundschau, xxxi, 1895.
- Harbridge, D. F. Arizona Med. Jour., Nov., 1914.
- Herbert. Wiener med. Blätter, Vienna, 1889.
- Hobby, C. M. Arch. of Ophth., N. Y., xi, 1882, p. 34.
- Holden, W. Trans. Amer. Ophth. Soc., 1898.
- Horner. Quoted by de Schweinitz in "Toxic Amblyopias."
- Huseman. Medical Record, April 4th, 1903.
- Jodko. Abstract in Nabel's Jahresbericht, 1877, viii, p. 217, and reference in de Schweinitz' "Toxic Amblyopias."
- Kalebiakin, A. T. Wiestn. Oft., Oct., 1911, and Ophthalmic Review, Vol. xxxi, p. 244.
- Kaz, R. Ophth. Review, xxxi, 1912, p. 245.
- Keiper, G. F. Ophth. Record, xx, p. 604.
- Kirkpatrick, H. The Ophthalmoscope, 1916.
- Knapp, H. Arch. of Ophth., N. Y., x, 1881, p. 225.
- Laveran, A. "Paludism," p. 128.
- Lewis, H. C. Western Jour. of Med. and Surg., Louisville, Ky., 1845.
- Lopez. Recueil d'Opht., Paris, 1888.
- M'Gillivray, A. Scottish Med. and Surg. Jour., Nov., 1904.
- McLean, J. Illinois & Indiana Med. and Surg. Jour., 1846.
- Manolescu. Klin. M. f. Augenh., xlix, Sept., 1911.
- Mayou, M. S. Trans. O. S. of U. K., xxxv, 1915.
- Mélier. Bull. de l'Acad. Roy. de Méd., Paris, 1842-3, viii.
- Mellinger, C. Klin. M. f. Augenh., Stuttgart, xxv, 1887.
- Michel, C. E. Arch. f. Augenh., Wiesbaden, 1881-2, and Arch. of Ophth., x, 1881.
- Miller, G. V. B. M. J., Aug. 19th, 1905.
- Miccichi. Med. Record, April 4th, 1903.
- Mosso. Klin. M. f. Augenh., Feb., 1911.
- Morgenroth, J. Amer. Jour. of Ophth., Feb., 1915.
- Mosso. Klin. M. f. Augenh., Feb., 1911.
- Muntedam. Reference in Brit. Jour. of Ophth., vol. i, 1917, p. 160.
- Myer, L. The Lancet, March 21st, 1914.
- Nettleship, E. Trans. of O. S. of U. K., vii, 1887.



- Nuel. Nagel's Jahres, 1871.  
 O'Brien, J. J. B. M. J., 1886.  
 Oliver. B. M. J., April 22nd, 1916, p. 580.  
 Parker, F. J. Arch. of Ophth., xxxv, 1906.  
 Parker, T. J. Arch. f. Augenh., lvi, 1906.  
 Peña. Cetrablatt f. prakt. Augenh., Leipzig, 1882, vii.  
 Peschel. Centralblatt f. prakt. Augenh., 1887; and Annali di Ottamologia, Pavia, 1887-8.  
 Pischl, K. Med. News, Phila., 1893.  
 Prewitt, R. C. Mississippi Valley Med. Monthly, Memphis, 1886.  
 Reina. La Clinique Ophtalmologique, Aug. 10th, 1903; & The Ophthalmoscope, iv, p. 80.  
 Rogers, J. G. Alienist and Neurologist, St. Louis, 1882.  
 Rombach, K. A. Schmidt's Jahrbuch, xx, 1838.  
 Roosa, D. B. St. J. Arch. of Ophth., N. Y., 1878, viii; and Trans. Amer. Ophthal. Soc., Boston, 1885-7.  
 Roosa and Ely. Arch. of Ophthal., N. Y., ix, 1880.  
 Saunders, D. D. Mississippi Valley Med. Monthly, No. 11, 1882, and de Schweinitz' "Toxic Amblyopias."  
 Scheel. Ugeskrift for Lager, lxxviii, p. 1160.  
 Schwabe, G. Arch. of Ophth., xxxiv, 1905.  
 Shahan, W. E. Amer. Jour. of Ophth., xxxiii, 1916.  
 Schulz, H. Virchow's Archives, Berlin, cix, 1887.  
 Solomon, J. V. Ranking's Abstract, Lond., lv, 1872, and de Schweinitz' "Toxic Amblyopias."  
 Stasinski. Klin. M. f. Augenh., Feb., 1911.  
 Terrien and Aubineau. Arch. d'Opht., xxxiii.  
 Tiffany, F. B. Recueil d'Ophtalmologie, Paris, 1890.  
 Trousseau. Dictionnaire de Médecine, Paris, 1842, pp. 544 et seq.  
 Trousseau et Pidoux. Traité de Thérapeutique et de Matière Médicale, vol. ii, p. 323, 1841.  
 Tyson, H. H. Arch. of Ophth. xl, p. 424.  
 Uhthoff. Graefe-Sacmisch Handbuch, xi, 1911; and Klin. M. f. Augenh., lvii, p. 14.  
 Underhill, E. C. Jour. Amer. Med. Assoc., p. 1396, 1914.  
 Upshur. Med. Record, April 4th, 1903.  
 Von Graefe, A. Archiv. f. Ophtal., Berlin, 1857, iii.  
 Von Kubli, F. Viestnik Ophth., xxvi.  
 Von Speyr. Klin. M. f. Augenh., liii.  
 Voorhies, A. H. Trans. of the Amer. Med. Assoc., 1879.  
 Wakefield, Alice. New York Polyclinic, 1893, ii.  
 Webster, D. Arch. of Med., N. Y., x, 1883.  
 Weeks, J. E. Arch. of Ophth., N. Y., xlv, 1916.  
 Welton, C. B. Annals of Ophthalmology, xxi, 1912, p. 739.  
 Williams, E. Trans. Amer. Ophth. Soc., Boston, 1885-87, vol. 4, p. 66.  
 Wood. Med. Record, April 4th, 1903.  
 Zani, D. Ann. di Ott., xl, p. 377, 1912.  
 Zanotti, M. Ref. in Ophth. Rev., xviii, 1899.

## ACUTE IRITIS DEVELOPED AFTER AMEBIC DYSENTERY.

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Report of a case in which acute iritis appeared after acute amebic dysentery, resisted other treatment, and rapidly improved under injections of emetin hydrochlorid. Translated from the Spanish by H. Aufmwasser, M. D.

The manner in which dysentery of the tropics, caused by the *Entameba histolica*, affects the large intestine, liver, lungs, pleura, the nervous system, and the joints has been well studied. The disturbances it creates are sometimes due to the presence of the amebas, or in other cases seem to be caused by the secretions of the par-

asite, which when absorbed and carried by the blood, affect the organs. But we have not found anything written which treats of disturbances of vision in amebic disease; and it does not seem possible that tissues so richly vascularized and sensitive as are those of the uveal tracts, should escape all pathogenic action of those protozoa

manifested by an acute iritis, such as is the object of this communication.

In no way should it be thought that in such cases the amebae themselves may be present, producing the changes in the eye; because it is not a necrotic process of the iris. There seems to be rather an irritation provoked by the secretions of the parasites proceeding from a distant point.

Our case has an obscure etiology, if we do not consider the amebic dysentery which has preceded; and the fact that the eye lesions did not react to the ordinary or regular treatment, but persisted without undergoing any change until one injected emetin hydrochlorid. The improvement coincided also with the disappearance of the amebae in the fecal matter. This seems to us to be important enough to be taken into consideration. Naturally from one isolated case, it is not possible to form a conclusion. Our object is to state the fact that amebic infection should be taken into consideration as a cause in future cases.

The etiology of amebic iritis should not only interest the oculists in the tropics; because the world war is showing plainly that the dysentery of warm climates is perfectly developed and transmitted in Europe, where it also takes an epidemic form.

Our patient is a young lady of this city, age 18 years, well developed, without any pathologic past. She has never suffered from the eyes. Her parents are living and well.

On February 12th she had to consult a physician for dysenteric symptoms of medium intensity, the duration of which was one week; and which easily yielded to diet and intestinal lavage with creolin. During the convalescence, on the fourth day, she began suffering disturbances in her eyes which resisted all remedies. Three weeks after this condition, we were consulted.

On the 18th of March she presented the following condition: Diminution of vision, frontal headaches, photophobia, lachrimation, conjunctival and ciliary injection. Pupils medium, contracted, and sluggish. Iris: color of

dead (dry) leaf, placed on the anterior crystalline lens; its free border adherent to the anterior portion of the lens. Media, transparent. Fundus, normal; teeth, healthy. Mammary glands normal; tonsils, small and atrophied. Lungs, healthy; liver, normal. Genital organs, sound. No furnuculosis or abscess in any part of the body. Blood test: eosinophilia and polynucleosis.

It was evidently a case of acute iritis, bilateral, of medium intensity, complicated by posterior synechiae. As to the etiology of such an iritis, the ordinary antecedents were lacking and the investigation did not make it any clearer; only dysentery preceded the ocular symptoms.

We applied the treatment advised in such cases: Treatments—general and local, hot fomentations on the eyes, instillations of dionin-atropin, and visual rest in a dark room. With this treatment the synechiae were broken and we obtained complete dilation, but nothing else. The clinical picture persisted three weeks, without any improvement being noted, nor any aggravation. Bearing in mind the results of the blood test and dysentery, which we have mentioned, we sent the fecal matter to be analyzed. The result was: An abundance of *Entamoeba histolytica*. Although the literature does not record iritis from this etiology, we think that the large quantities of amebae in the intestines could be the cause of the iritis. We explained the process, not by the development of the amebae in the tissue of the iris, but by the action of their secretions on the same, which introduced into the intestines, and absorbed were carried by the blood into the eye.

Being convinced of such possibility, we did not change the local treatment; and began injecting 0.08 centigrams of emetin hydrochlorid, increasing by 0.02 centigrams daily up to 0.12 centigrams without inconvenience.

Result: Improvement from the first injection, disappearance of the manifestations in the left eye on the third day. Test of the fecal matter on the same date: Small quantities of amebae. Two more injections were suffi-

cient to cause the disappearance of the disturbances in the right eye. The local medication was suspended. A new examination of the fecal matter proved negative. The following days the injections were continued until the introduction into the organism of 0.90 centigrams of emetin hydrochlorid. The

microscopic tests were repeated and proved negative. We have frequently seen the patient and she has not manifested any further disturbances of her vision.

[In this connection see the cases of iritis and cyclitis occurring in connection with bacillary dysentery, p. 451.]

## PROBABLE ROLE OF TEETH AND TONSILS IN THE ETIOLOGY OF INFLAMMATORY EYE DISEASES.

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BIRMINGHAM, ALABAMA.

Mention of the earlier literature of the subject with reports of cases arranged according to the eye lesions exhibited, and bibliography. Thesis submitted for the degree of Doctor of Ophthalmology, University of Colorado Graduate School.

Medical literature of recent years embraces much on the etiologic relationship of accessory sinus inflammations to eye diseases. Since 1913, a large number of articles have dealt with relationship of intestinal and dental disorders.

The epoch making work of Rose<sup>now</sup> on the transmutation and selective localization of pyogenic organisms in the various tissues of the body has revolutionized some of our ideas of etiology and pathology.

The experimental and clinical investigations of Irons<sup>20-21</sup> and Brown have been especially valuable in classifying our otherwise hazy ideas of the infections producing iritis. Until recently iritis and iridocyclitis were regarded as practically always due to syphilis, gonorrhea and tuberculosis.

In the R. L. Oph. H. Reports for November, '14, Goulden<sup>14</sup> details a careful study of 6,835 cases of eye diseases, and proves to his own satisfaction that many cases of iritis and choroiditis were secondary to and caused by pyogenic infections of the mucous membranes. His article is most exhaustive and illuminating.

Wm. Lang, of London, has likewise tabulated the etiology of 383 cases of inflammatory eye diseases and demon-

strates that in 215 of these some of the pyogenic infections existing in other regions of the body were the underlying causes. He names appendicitis, kidney, skin, nasal, colonic, pyorrhea, throat, and other chronic infections, and says that every tissue of the eye is subject to infection, secondary to either and all of these.

In the transactions of the International Medical Congress for 1913, de Schweinitz<sup>29</sup> reviewed the literature, and argued that any infection of the oral or intestinal mucous membranes may possibly produce secondary lesions in various tissues of the eye.

Wescott,<sup>34</sup> Krebs, Haskins,<sup>17</sup> Burt,<sup>7</sup> Campbell,<sup>8</sup> Hardy,<sup>15</sup> Ibershoff,<sup>18</sup> MacKenzie,<sup>24</sup> and others have presented interesting articles in this connection.

In the spring of 1912 the following case came under my observation and the unsatisfactory efforts to discover its etiology suggested the line of study elaborated in this paper.

Case A.—I. B., white female, age 11, referred for the relief of recurring inflammation of the left eye. Father, mother, four brothers, and three sisters living and well. Patient had measles at age of six and since that time has had frequent attacks of sore throat. Other than this, the history is



negative. The right eye is apparently normal. The left eye counts fingers at one meter and vision is unimproved by lenses. The conjunctiva of the left eye very red—bluish red, more pronounced near limbus. Several leucomata about periphery of the cornea, especially the lower border. Anterior chamber is clear and rather deep. Iris has greenish brown, muddy appearance, and the pupil is fixed.

At this time the eye was not painful but the parents say there had been much pain during each of some five or six attacks, occurring at intervals of six to eight weeks during the past two years. There was no specific history in the father and no miscarriages by the mother. Wassermann was negative. The general appearance of the eye was very suggestive of luetic iritis. The child was given a hypodermic of mercury as a provocative, after which a second Wassermann was made, but it was likewise negative. The child was referred to an internist for thorough examination and he reported no evidence of any systemic disease. A radiograph of the chest showed no enlarged bronchial glands. A von Pirquet was negative.

This child was under observation for two months, during which time the usual remedies were employed without relief. Notwithstanding the negative Wassermann, she had active specific treatment, but of no avail. The tension finally became minus, the eye blind, and it was enucleated. The eyeball was sent to Dr. Graham, who reported that he "could find no evidence of tuberculosis or syphilis"; but thought it a "case of chronic inflammation, possibly due to some pyogenic organism." Two months later the child had acute tonsillitis and visited my office for treatment, receiving the silver applications, rest in bed, hot saline gargles, etc. Barring of acute nephritis, she seemed well in a fortnight. About a month after recovery from the tonsillitis she consulted me for pain and redness in the right eye, which had the appearance of irritation from some foreign body, but none was found. The next day she returned with definite

signs of iritis; and on this visit had temperature of 101 with an acute arthritis of the left wrist. She went to the hospital and her tonsils were enucleated that day. The pupil of the eye was dilated easily with one drop of 1 per cent solution of atropin, q. i. d., for two days. All signs of irritation in the eye and all signs of arthritis cleared up within a week. A month or two later I heard Dr. Haskins of New York present a paper to the American Otolological Rhinological and Laryngological Society on "latent dental abscess" and it was the impression made by the case above mentioned and by the paper presented by Dr. Haskins that started me on this line of study in the summer of 1912.

Before attempting to establish any relationship between the special eye diseases, and some probable focus of infection about the mouth, a careful examination with assistance of radiographic study of the lungs, urinalysis and Wassermann test (after provocative doses of mercury) were employed. The assistance of an internist was enjoyed with each case. Every effort was made to exclude tuberculosis, gonorrhea, and syphilis as possible factors.

#### IRITIS.

Case I.—Mrs. W., white, age 27, consulted me in July, 1912, for pain and redness in left eye of two weeks' duration. On examination the right eye was normal, with vision of 6/5. The left eye showed general injection, redness, more marked about edges of the cornea. Pupil reacted sluggishly. Outlines of the iris were cloudy. Patient gave history of frequent attacks of tonsillitis, the last occurring one week before the onset of the present eye irritation. The dentist reported the gums in good condition, and in no teeth had the nerves been killed. There were no signs of irritation in the throat, the tonsils were small, the crypts distended with yellow, cheesy debris. There was a history of muscular pain at various times within the preceding year, and a rather suggestive history of arthritis in the left elbow four months before. Immediate tonsillectomy was urged,

and performed on the second day. The pupil of the inflamed eye was very slightly contracted and the reaction was sluggish, but there was no evidence of synechiae. In the treatment of this case, the pupil was not dilated, the patient was kept in bed one week, given no medicine, and at the end of this time the general appearance of the eye was hardly different from that of its fellow.

Case II.—Mrs. K., white, aged 39, consulted me in November, 1912, complaining of recurring attacks in first one eye and then the other during the preceding year. At the time of examination there was a dark bluish circle around each cornea, sluggish reaction of each pupil and slightly greenish reflex from each iris. Patient had been in bed more than half the time for the preceding two months with inflammations of wrists, ankles and two finger joints. She had four healthy children and had suffered no miscarriages. There was marked disease of each tonsil with cryptal retention and the consulting dentist advised immediate removal of two teeth showing dental abscesses. The pupils were dilated at once, the teeth removed that day and her tonsils enucleated ten days later. The mydriatic was omitted the day of the tonsillectomy. The eyes returned to apparently normal condition in three weeks, and there was a slow but steady improvement in the "rheumatism." This patient gained 30 pounds in a year and was seen in 1916, four years later; and there had been no recurrence of eye irritation and no further suggestion of "rheumatism."

Case III.—Mrs. B., white, age 33. First seen in May, 1913, for "iritis of left eye." She had made her own diagnosis, stated it was the "third attack" and she "recognized the symptoms." She claimed to have had two previous attacks of "rheumatism," always in the left ankle and always associated with or followed by an attack of "iritis in the right eye." The left ankle was swollen, tender and red. Patient had temperature of 100 3/5. She presented the usual symptoms of iritis of a very mild degree in the right eye. It struck me

as rather peculiar that the arthritis should be always in the left ankle and iritis in the eye of the opposite side. On close investigation I found that the left ankle had been severely sprained four years before, requiring the use of splints for six weeks. At a subsequent period, I refracted this patient under atropin and found that she needed a plus 1.00 D. cylinder for the right eye at 90 and for the left eye a +.25 D. sphere. It would seem that the disease had located itself in this case in a left ankle, made weak by a former injury; and in the right eye, because of eye strain. This woman was the mother of three healthy children with no history of miscarriages. The tonsils presented no signs of acute irritation, they were small, the crypts showed definite retention. The tonsils were removed the next day and in the left was found an abscess containing fifteen or twenty drops of pus. The inflammation of the eye disappeared in a few days and it seemed normal at the end of two weeks. This patient has been seen once or twice each year for the last three years and has suffered no return of arthritis or iritis.

Case IV.—Male, white, age 27, clerk. First seen in May, 1915. Has always enjoyed perfect health and had no leutic history. Returning six weeks ago from a fishing trip was delayed in rain and "caught cold," and to this he attributes an attack of pain in the left elbow joint and associated with it, severe pain, redness and irritation in each eye. This man's left eye showed the classical signs of serous iritis. A careful examination of the tonsils showed no disease. His gums were apparently perfect and normal, and one was at a loss to explain the possible cause of his infection. A careful radiograph showed apical abscess of the anterior bicuspid tooth of left upper jaw, and after its removal the pain of the elbow and signs of inflammation in each eye rapidly disappeared.

#### UVEITIS.

Case I.—A. G., white female, age 9. Was first seen July, 1914, referred by family physician for "granular lids."



Father denies any specific infection; mother's history without interest except she has had three miscarriages and has four healthy children. Child is small but healthy and robust; has been confined to bed for periods of four to eight weeks at five different times with "inflammatory rheumatism," the most recent attack lasting six weeks, occurring four months ago. Has had no "rheumatism" in the joints since that time, but has suffered two attacks of tonsillitis each of one week's duration. The mother said child had "growing pains" frequently, but only after "taking cold." The eyes were red and showed much irritation. There was marked photophobia of the right eye. Pupil of right eye was two or three times normal size, pupil of left eye was greatly contracted and both were immobile. The posterior surface of each cornea, in its lower half shows numerous mutton fat droplets. The vision of the right eye was 6/18, left eye 6/24, much cloudiness of the vitreous in the right eye. The Wassermann, after a provocative was negative. Child had four teeth in upper jaw and three in lower with badly diseased crowns, gums red and irritated. The tonsils were large, bleeding on pressure—the typical "succulent" kind. The diseased teeth were removed and the mouth cleansed every hour for two or three days, after which the tonsils were enucleated. For five days preceding the tonsillectomy I was instilling into each eye four times daily, a one per cent solution of atropin, but had been unable to dilate either pupil. The atropin was discontinued the day of the operation, but five days after the tonsillectomy the child complained of severe and sudden pain in the left eye and it so happened that I was in the hospital at the time. I examined her carefully, after having seen her one hour before. During this hour there had been marked dilation of the pupil excepting for two synechiae in the lower outer quadrant. There was no apparent increase of tension in the eye to the finger test. Atropin was begun in each eye one week after operation and in a few days each pupil had reached its maximum.

Another interesting phase of this case was that four days after the operation, and the day preceding occurrence of the above attack of eye and brow pain, the child was taken with precordial angina, so severe that it was unrelieved by ice bags and paregoric; indeed it was unrelieved until she had received three hypodermics of morphin. Her condition was carefully studied by an internist, who failed to find any heart lesion and there was no rise of temperature. This peculiar attack remains unexplained. A second Wassermann was made after the child left the hospital and it likewise was negative. However, in spite of second negative Wassermann, remembering the history of miscarriages, I had strong suspicion that there might be lues in this case and gave antisppecific treatment for two years. Within four months after the operation the child's eyes were normal and there has been no recurrence of eye symptoms or arthritis.

Case II.—*Recurring uveitis of four years duration.* Mrs. H., white, female, age 30, 1914, father living, mother dead of some acute illness. Brothers and sisters living and well. Extremely nervous, but gives no history of any definite disease. Is mother of one healthy child. According to her physician the patient is now suffering with a typical attack of sciatica, also has pain and tenderness in right wrist, so severe as to prevent its use. She was thoroughly examined by an internist, who reported phlebitis of left femoral vein. The Wassermann was negative. White blood count 16,500, polymorphonuclears 65, small lymphocytes 30. Tonsils were large and crypts distended with foul debris. The tonsillar condition was regarded as a probable cause of all symptoms, but radiographs of the teeth were secured. This showed latent abscesses. At this time the vision of the right eye was 15/20, left eye could only count fingers at one meter. The sclera was a deep violaceous tint, with intense injection around cornea, and mutton fat droplets on posterior corneal surface, pupil slightly dilated with fixed outlines. The fundus of the eye not seen—only a slightly pink reflex recog-



nizable. Patient gave a history of having four previous attacks within period of four years, in the last preceding attack she was seen by the writer. The tonsils and teeth were removed, there was quick relief from the pain in wrist and sciatica. There was steady improvement of the phlebitis. The eye had no treatment whatever except the persistent use of a mydriatic. The signs of infection disappeared within eight weeks, and at the end of four months the vision was 15/20 with .50 S. and 1.00 c. ax.  $105^{\circ}$ ; and aside from the few floating filmy shreds in the vitreous the media are now normal. There has been no return of the eye discomfort after a lapse of nearly three years.

#### EPISCLERITIS.

Case I.—Miss J. D., white, age 20, recurring attacks of redness, soreness and pain first in one eye and then in the other at intervals for the past two years. Consulted me during the fifth attack. There was a slight papule of pearly hue surrounded by deep redness in the left eye some six millimeters external to the limbus. There was profuse lacrimation, throbbing and burning of eyes, with a temperature of  $100\frac{1}{2}$ . This patient gave a good family history; and there was nothing in the personal history except great menstrual discomfort monthly, persisting for two or three days. She was referred to her family physician for examination who reported that he could find nothing abnormal. The tonsils appeared free of disease. A radiograph of the sinuses showed no abnormality. There was a great deal of pyorrhea around the roots of several teeth, and apical abscesses or granulomata at the roots of three. The pupils were dilated, but the patient received no other treatment. The teeth were removed. The pockets well curetted and the pyorrhea treated. The day after the removal of the teeth, the patient had an acute arthritis of the left wrist joint; with temperature of  $103^{\circ}$ . Four days later, this rapidly subsided and within a week it entirely disappeared.

Case II.—Miss A., white, female, age

21, father died at age of 65, of pneumonia. Mother living and has diabetes; two brothers and three sisters living and healthy. Has had good health. Tonsils removed two years ago because of cervical lymph nodes and "rheumatism." Neither condition has been entirely relieved by tonsillectomy. Since April, 1912, she has had several attacks of inflammation in the left eye. First seen in May, 1914, with pain, redness, browache, grayish nodule, three millimeters external to limbus of right eye. Urinalysis negative, Wassermann negative. Patient had taken 20 or 30 grains of aspirin daily for a period of five to ten days, for attacks similar to this on several occasions, and said she always had to have her "pupils dilated for a period of three or four weeks." She was referred to an internist who said he could find no physical condition to account for this discomfort. Patient was refracted—right eye,  $-0.75$  D. c. ax.  $75^{\circ}$ , left eye  $0.62$  D. c. ax.  $105^{\circ}$ . Patient wore this glass for several weeks and had a mild return of the inflammation in the eye in October, 1914. It was then that I first advised a radiograph of her teeth. This showed latent dental abscess or a granuloma at the end of one bicuspid. The latter was removed and the cavity curetted, and this time the patient was given no anodyne and no mydriatic was employed. There was a definite improvement on the third day, with complete relief from all discomfort and entire disappearance of all redness on the ninth; and there has been no return of the discomfort after a lapse of two and a half years.

Case III.—Miss S., white, female, age 20, a stenographer, complains of recurring redness, burning pain and nodular swelling over the white of the left eye, near insertion of the externus muscle. Father dead, supposed to be from tuberculosis. Mother living and healthy. Lost two brothers in early childhood; only sister is living and well. Has had the usual diseases of childhood, but other than this had been perfectly well. Wears glasses,  $+0.75$  D. with  $+0.25$  D. c. ax.  $90$  for each eye. Suffers no headaches, has no eye

discomforts except during these attacks of redness, swelling and pain. The first attack in which I saw her was the fifth from which she suffered. She was treated with antirheumatics, mydriatics and rest, with recovery in four weeks. This was in 1911. I saw her in two similar attacks in 1912, and treated them successfully along the lines mentioned above. In 1913, I saw her in another attack, and it then occurred to me that the teeth might have some connection. They appeared to be in good condition, except one or two small cavities that were not thought to have any influence. The teeth were carefully radiographed with a negative result. I then found that the crypts of each tonsil were filled with offensive detritus and knowing that we were claiming to cure many cases of subacute "rheumatism" by removal of such tonsils, advised tonsillectomy. The patient rather reluctantly consented and the eye symptoms cleared up before the throat healed entirely. During this attack the patient's pupils *were not dilated*. After four years there has been no recurrence.

#### CORNEAL ULCER.

Case I.—G. E., white male, age 56, first seen in 1913 regarding superficial ulcer over center of right cornea, slight pain, much irritation and lacrimation, scleral injection and photophobia. Negative Wassermann. Patient uses neither tobacco nor alcohol. Usual treatment for ulcer. The eye was improved but never remained well longer than a few weeks. Was under observation two years and seen by several oculists. Patient was thought to have had tuberculosis twenty years before, and he was frequently examined and had radiographs of the chest, but the consultants reported all findings as negative. The tonsils were bad. Many of the crypts containing detritus, abundant and offensive. There was much pyorrhea, several pus pockets and latent apical abscesses or granulomata at roots of four teeth. He declined tonsillectomy but the crypts were cleaned out at intervals of two or three days with air blast and diluted alcohol, with

marked improvement of the condition in his throat. The diseased teeth were removed, the gums properly treated. After a few weeks his eye greatly improved, the ulcer healed entirely and after eighteen months there was no return of the ulceration, altho there was a slight leucoma. About this time he left his home for several weeks travel. His tonsils were not cleaned out periodically as had become his habit. He developed an attack of acute cryptal tonsillitis followed by a recrudescence of his eye ulcer. It was no longer difficult to persuade him to have the tonsillectomy. This was performed, and after nearly one year he has remained free from all suggestion of eye discomfort.

#### RETROBULBAR NEURITIS.

Case I.—March, 1916. C. B., white male, age 67, has enjoyed good health all his life. Retired from business a few years ago, and since then has spent much of his time recreating and fishing. Said his general health was excellent. He was an inveterate smoker, had never used alcohol. Had recently noticed what he described as a "shadow" growing over field of vision, which seriously interfered with his comfort. "It seems like a filmy curtain dropping down from above." Had glasses changed several times in the last year, and still felt that they were far from satisfactory. Had no pain whatever about the eye except that when washing his face he complained that the "pressure of my fingers on the eyeballs caused discomfort." The pupils reacted to light but were rather sluggish. The eyes appeared normal, the movements in every direction were satisfactory. There was nothing discoverable on ophthalmoscopic examination. He was referred to an internist, who reported him free of any definite disease, but the blood pressure was 180 systolic 110 diastolic. The Wassermann was negative. Ten days later the patient was given a provocative dose of mercury and the second Wassermann likewise showed negative. This man was taken off his tobacco, given small doses of mercury, put to bed and had



sweat baths twice daily for two weeks. The patient felt that there was a definite "thinning out of the shadow" of which he complained, and there was an improvement in his visual acuity. A month later his condition began to grow worse tho he had not smoked at all during the six weeks. I had already advised him it might become nec-

essary to have his teeth examined. The dentist reported extensive pyorrhea and abscesses or granulomata at the roots of seven or eight teeth. These teeth were extracted and his gums were treated. There was apparent cessation of progress of his troubles, but after two years there has been little improvement in his vision.

#### BIBLIOGRAPHY.

1. Babbitt (O. M.). Focal infections complicating the eye. *Northwest Med.*, Seattle, 1917, XVI, 276-278.
2. Beaumont (W. M.). Iritis; rheumatic and toxic. *Proc. Roy. Soc. Med.*, Lond., 1913-14, VII, Ophthalmol. Sect., 55-66.
3. Beaumont (W. M.). An address on the evolution of toxic iritis. *Brit. M. J.*, Lond., 1914, II, 525-527.
4. Bentley (F.). Report of a case of endogenous panophthalmitis due to colon bacillus. *Ophth. Rec.*, Chicago, 1911, XX, 352-354.
5. Brawley (F.). The consideration of systemic diseases affecting the ocular tissues. *Ophth. Rec.*, Chicago, 1915, XXIV, 563-575.
6. Brinton (A. G.). The influence of dental diseases on the eye. *Med. J. S. Africa*, Johannesburg, 1916, XI, 159.
7. Burt (J. B.). Acute iritis in rheumatoid arthritis. *Ophthalmoscope*, Lond., 1908, VI, 11-14.
8. Campbell (E. K.). Oral sepsis as a cause of iritis. *Lancet*, Lond., 1905, II, 219.
9. Dalmer (M.). Ueber metastatische Panophthalmie infolge Pneumokokkeninfektion. *Beitr. z. Augenh.*, Leipz. u. Hamb., 1914, Heft 87, 567-577, 1 pl.
10. Dulaney (O.). Some diseased conditions of the eye secondary to infection in other parts of the body. *J. Tenn. M. Ass.*, Nashville, 1917-18, X, 240-244.
11. Fejer (J.). Ueber die wechselseitigen pathologischen Verhältnisse der dem Auge und der Nase benachbarten Höhlen vom augenärztlichen Standpunkte. *Berl. klin. Wchnschr.*, 1913, L, 2269-2272.
12. Fuchs (E.). The pathogenesis of chronic uveitis, excluding the syphilitic, tuberculous, and sympathetic varieties. *Tr. Internat. Cong. Med.*, Lond., 1913, Ophthalmol., I, 1-5. (Discussion): II, 5-7.
13. Goulden (C.). Some inflammatory eye conditions due to oral sepsis. *Proc. Roy. Soc. Med.*, Lond., 1910-11, IV, Odont. Sect., 27-36.
14. Goulden (C.). Inflammation of the uveal tract secondary to infection of mucous membranes. *Roy. Lond. Ophth. Hosp. Rep.*, Lond., 1914, XIX, Part III, 328-375.
15. Hardy (W. F.). Ocular diseases of dental origin. *Am. J. Ophth.*, St. Louis, 1917, XXXIV, 97-105.
16. Harman (N. B.). Some eye diseases associated with sepsis of neighboring mucosae. *Clin. J.*, Lond., 1906-7, XXIX, 252-255.
17. Haskin (W. H.). Diseases of the eyes in focal infections of the teeth. *Dental Cosmos*, Phila., 1916, LVIII, 1039-1044.
18. Ibershoff (A. E.). Carious teeth as a factor in ocular disease. *J. Ophth. and Oto-Laryngol.*, Chicago, 1915, IX, 141-146.
19. Ibershoff (A. E.). Ocular disease of dental origin. *J. Ophth. & Oto-Laryngol.*, Chicago, 1915, IX, 209-213.
20. Irons (E. E.), Brown (E. V. L.), Nadler (W. H.). The localization of streptococci in the eye, i. e., study of experimental iridocyclitis in rabbits. *J. Infect. Dis.*, Chicago, 1916, XVIII, 315-334.
21. Irons (E. E.) and Brown (E. V. L.). The etiology of iritis. *J. Am. M. Ass.*, Chicago, 1916, LXVII, 1840-1844.
22. de Kleijn (A.) and Gerlach (N.). Pathologische-anatomisches über den Zusammenhang zwischen Augen-und Nasenleiden. *Arch. f. Ophth.*, Leipz., 1914, LXXXVII, 157-159.
23. Langdon (H. M.). Nodular iritis accompanying a polyarthritis of undetermined origin. *Tr. Coll. Phys.*, Phila., 1916, 3 s., XXXVIII, 356.
24. Mackenzie (G. W.). The relationship of dental pathology to eye, ear, nose and throat conditions. *J. Ophth. Otol. and Laryngol.*, Lancaster, Pa., 1915, XXI, 434-438.
25. MacWhinnie (A. M.). The teeth and their relation to the eye. *N. York Med. J.*, 1913, XCVIII, 755.
26. Reeder (J. F.). Recent ideas of iridocyclitis with special references to focal infection with report of several cases. *J. Iowa State M. Soc.*, Des Moines, 1917, VII, 305-307.



27. Rosenow (E. C.). Iritis and other ocular lesions on intravenous injection of streptococci. *J. Infect. Dis.*, Chicago, 1915, XVII, 403-407, 3 pl.
28. Schwabe. Beziehungen zwischen Augen und Zahnkrankheiten. *Deutsche Monatschr. f. Zahnh.*, Leipzig, 1914, XXXII, 401-407.
29. de Schweinitz (G. E.). Concerning focal infections in their relation to certain disorders of the uveal tract. *Ophth. Rec.*, Chicago, 1915, XXIV, 602-610.
30. Sedwick (W. A.). Iridocyclitis due to pyorrhea. *Ophth. Rec.*, Chicago, 1916, n. s., XXV, 261.
31. Stark (H. H.). Two cases of eye involvement caused by focal infection of the teeth. *N. Mexico M. J.*, Las Cruces, 1915-16, XIV 5-8.
32. Thompson (H. M.). Iridocyclitis secondary to pyorrhea alveolaris. *Ophth. Rec.*, Chicago, 1917, XXVI, 591.
33. Tibbles (S. G.). Two cases of ocular disease associated with pyorrhea alveolaris. *Brit. M. J.*, Lond., 1914, I, 755.
34. Wescott (C. D.). Inflammations of the eye and focal infections. *Railway Surg. J.*, Chicago, 1916, XXII, 457-459.
35. Wood (D. J.). Oral and intestinal sepsis in relation to the diseases of ophthalmic patients. *South African M. Rec.*, Cape Town, 1914, XII, 192-194.

## CONVERGENT STRABISMUS TREATED BY ATROPIN AND GLASSES; WITH SOME CASES OF HEREDITARY STRABISMUS.

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A tabular report of twenty-nine cases of convergent strabismus showing the results obtained by non-operative treatment, with a series of cases of hereditary strabismus. Read before the Chicago Ophthalmological Society, April 5<sup>th</sup>, 1918.

In 1914 Valk read before the American Academy of Ophthalmology and Oto-Laryngology a paper entitled "Strabismus," during the course of which he advocated, at least by implication, its invariable treatment by operative means. It is not always fair to an author to quote isolated paragraphs, but the following seem to me to contain the gist of his paper, and to present his position correctly:

(1) "Finally, I would like to ask the question, even though we are urged not to operate until all other methods fail, when should we operate on these cases? Or, to put the question in another way, should we not operate on all cases of squint? That last question is a very broad one, and I fear many will say it is all wrong; but it is a question often in my mind, altho I have not yet the courage to urge its advancement."

(2) "If an operation must be performed, if that is the final procedure, then the reason for that operation must

be the true cause of all cases of strabismus."

(3) "Where shall we draw the line between latent and fixed squint \* \* \* all the anatomic conditions are the same in both conditions of squint."

(4) "The true cause of squint must reside in the muscular balance of the eyes, and it seems also suggests to the inquiring mind that weak muscular action associated with any of these contributing causes may produce convergence that may be corrected by glasses; and that excessive muscular action must demand operative interference, and all other means will be useless. Hence a diagnosis of muscular balance suggests the proper procedure for correcting the contributing cause, or, if necessary, a suitable operation."

The author's style is somewhat involved and at times difficult to follow, but the above quotations indicate that he believes all cases of strabismus, fixed or latent, require an operation, although in the last quotation he seems

to admit the possibility of other remedial measures being sufficient. The operation he advocates is that of "shortening the muscle in its long diameter." I shall not enter into the question of which operation is the most desirable, when one has been deemed necessary, but it seems to me that so drastic a position as to advocate, even by inference, an operation in every case is one which demands a careful scrutiny in the light of experience with other methods.

I think that no one will disagree with the statement that where two procedures will accomplish the same end equally well, the simpler is to be preferred. In the second place, no operation, even so comparatively a simple one as that for the correction of strabismus is invariably successful. Third, an operation for convergent strabismus sometimes results ultimately in a condition of divergent strabismus, which is certainly no improvement over the primary condition. Finally, we are dealing with human beings, whose wishes must be taken into consideration. It is frequently difficult, not to say impossible, to persuade the patient or his parent to permit the operation; and it becomes a question then of insisting on it with the possibility of losing the patient, or of attempting to obtain results thru some other method. If these are unreliable and their results inadequate, we are stultifying ourselves by using them, and the sooner they are discarded the better, but if the opposite is true, no amount of theory will be able to overcome their practical value, and we are justified in using palliative treatment in suitable cases and when operation, tho indicated, is refused.

Shortly after Valk's article appeared, I determined to investigate the results of the strabismus cases which I had treated by my usual method of daily use of 1 per cent atropin for about a month, followed by complete or almost complete correction of the refractive error. Cards were sent out to 100 clinical patients requesting them to report for re-examination, but of this number only 29 answered. Many of

the cards were returned on account of change of residence, and the rest of the patients, or rather their parents, evidently did not consider the matter of sufficient importance to reply. The results are tabulated below. (See p. 670.)

Of these 29 cases, one never wore the glasses prescribed and one wore them only 3 months. This leaves only 27 cases of actual statistical value. One of these had not worn glasses for one year, but I include it among the failures, because the glasses were worn at least nine months, and presumably would have been worn longer had they been of benefit. Of the 27 cases, 11 were straight, 6 almost straight, 1 good, 5 improved and 4 not improved, that is, 40 per cent cures, 45 per cent improvements, and 15 per cent complete failures. However, some of the improvements were so pronounced that they could almost be called cures, only a trace of convergence persisting.

The length of time since the glasses were prescribed varied from 2 months to 6 years, and the ages of the patients ranged from 3 to 12 years. No reliance can be placed on the duration of the condition, as the answers to this question were as a rule not definite, varying from infancy to a few months. The presence or absence of heredity did not seem to play a determining role in the outcome of the cases, as some with definite taint obtained perfect results, while some where it was absent were not much improved. Likewise, the results were apparently as good when the refractive error was a compound hyperopic astigmatism with anisometropia, as when it was a simple hyperopia.

Case 20, with a simple hyperopia and a hereditary taint, did not improve, whereas in case 16, with a very probable family taint and a compound hyperopic astigmatism, oblique axis in one eye, and a simple hyperopia in the other, the strabismus disappeared after only 2 months.

Case 4 was unusually interesting. H. R., a girl 10 years old, with a most pronounced strabismus. Refraction R. E. + 0.5 S.; L. E. -4.0 cyl., ax. 180. In

the macula of the left eye there was a coloboma of both retina and choroid, and in the right eye there was a similar coloboma, but not exactly in the macula. Vision in each eye was only perception of large objects. As the strabismus had been present from infancy, the colobomata were probably congenital. Four brothers and 4 sisters had normal eyes, as did the mother. The father had chronic simple glaucoma. Nothing else could be learned about the family history. Full correction was given. The patient returned after 4 years with eyes almost straight. She was employed in a factory to paste labels on cans, and stated she had absolutely no difficulty in performing her tasks.

Case 17 came to me at the tender age of 3 years, with a most pronounced convergent strabismus. Refraction each eye  $+4.0$  S. Glasses ( $+2.5$  S. O. U.) were prescribed and in a couple of months, the eyes became completely straight. I saw her subsequently several times for recurring attacks of phlyctenulosis, the treatment of which necessitated abandoning glasses temporarily. Each time the strabismus reappeared, and each time promptly disappeared as soon as the glasses could be worn. Now, after 6 years, the eyes are absolutely straight so long as the glasses are worn.

Surely no better result could have been obtained by any operation, and the necessity for glasses would have been present just as much after as without an operation. And furthermore, there is always the possibility of the operation converting the convergent strabismus into the divergent form. I must absolutely disagree with Dr. Valk that an operation should be done in every case.

I have never operated on a patient younger than 13 years, and even in the case of patients over that age, have always first tried to correct the condition with glasses. There is usually no necessity for haste. A delay of six months or a year will not affect the outcome of the operation if eventually necessary, and I have yet to meet the patient who insisted on an immediate

operation. Usually it is the other way around. It is necessary, as a rule, to use considerable argument to convince the patient that glasses or treatment will not effect a cure.

#### HEREDITARY STRABISMUS.

In conclusion, I would like to report the following 33 cases of hereditary convergent strabismus, some of which are included in the foregoing table. The remainder did not report for subsequent examination, so I have no means of determining the ultimate results.

I. O. B., male, 11 years. Father, paternal and maternal grandfather strabismus. Four brothers and four sisters normal. This is a case of direct heredity, but in spite of the double taint, only one of nine children were affected in the third generation. (3 families; 11 children, 2 affected, 9 not.) Case 2 in table.

II. D. F., female, 4 years. Parents and 1 brother normal. Paternal aunt strabismus. This is a case of indirect heredity. (1 family; 2 children, 1 affected, 1 not.) Case 8 in table.

III. D. K., male, 6 years. Parents and 1 brother normal. 1 sister strabismus. This is a case of collateral heredity. (1 family; 3 children, 2 affected, 1 not.) Case 9 in table.

IV. L. N., female, 6 years. Mother, maternal grandmother, two maternal aunts and one maternal uncle strabismus. Two brothers normal. This is a case of direct heredity. (2 families; 7 children, 5 affected, 2 not.) Case 13 in table.

V. J. H., male, 9 years. Paternal uncle strabismus. Two brothers, one sister, father and mother normal. This is a case of indirect heredity. (1 family; 4 children, 1 affected, 3 not.)

VI. E. B., female, 10 years. Two sisters, mother and maternal aunt strabismus. Five maternal aunts normal. This is a case of collateral heredity (1 family; 7 children, 2 affected, 5 not); also a case of direct heredity (1 family; 3 children, all affected).



No.	Name	Age	Duration	Ob. Refraction.		Prescription.		Remarks
				R. E.	L. E.	R. E.	L. E.	
1	B. E.	7	1 year	+1.5 S +1.5 Cyl. ax. 90°	-0.5 S +2.5 Cyl. ax. 90°	ibid	ibid	Condition after 2 mos. about same. Mother says eyes at times entirely straight.
2	O. B.	11		-11.0 S -1.0 Cyl. ax. 60°	-12.0 S -2.0 Cyl. ax. 90°	-9.0 S -0.5 Cyl. ax. 60°	-10.0 S -1.0 Cyl. ax. 90°	Condition improved after 10 mos. Family taint.
3	M. F.	9	Latent	+7.5 S +4.5 Cyl. ax. 60°	+7.5 S +4.5 Cyl. ax. 115°	+4.0 S +2.5 Cyl. ax. 60°	+4.0 S +2.5 Cyl. ax. 115°	Eyes straight after 10 months.
4	H. R.	10	Infancy	+0.5 S	-4.0 Cyl. ax. 180°	ibid	ibid	Eyes almost straight after 4 yrs. Congenital coloboma macular region both eyes.
5	T. McL.	9	Childhood	+2.0 S	+1.5 S	+1.5 S	+1.0 S	Eyes almost straight after 4 yrs. Patient did not wear glasses for 2 yrs. and strabismus returned. Glasses again prescribed and eyes became almost straight.
6	A. K.	12	3-4 years	+2.0 S	+1.5 S	+1.5 S	+1.0 S	Eyes straight after 8 months.
7	H. G.	7	Several years	+4.5 S	+4.5 S +0.5 Cyl. ax. 90°	+4.0 S	+4.0 S +0.5 Cyl. ax. 90°	Improved after 6 months.
8	D. F.	4	Few mos.	+1.5 S +0.5 Cyl. ax. 90°	+3.0 S	+1.0 S +0.5 Cyl. ax. 90°	+2.5 S	Eyes straight after 4½ years.
9	D. K.	6		+3.0 S +1.0 Cyl. ax. 90°	+4.0 S	+2.5 S +1.0 Cyl. ax. 90°	+3.5 S	Eyes straight after 1 year.
10	M. T.	4	1 year	+4.0 S	+5.0 S	+3.5 S	+4.5 S	Almost straight after 2 months.
11	W. M.	9		+2.5 S +3.5 Cyl. ax. 90°	+3.0 S +1.5 Cyl. ax. 90°	+2.0 S +3.0 Cyl. ax. 90°	+2.5 S +1.5 Cyl. ax. 90°	Almost straight after 9 months.
12	O. Y.	4	1 year.	+2.5 S.	+2.5 S.	ibid	ibid	Improved after 2 months.
13	L. N.	6	4 years.	+2.5 S.	+2.5 S.	+2.0 S.	+2.0 S.	Straight after 4 mos. Hereditary strabismus.
14	D. M.	10	10 years	+6.0 S +2.0 Cyl. ax. 75°	+7.0 S.	+4.0 S +1.0 Cyl. ax. 75°	+5.0 S.	Straight after 20 months.
15	A. S.	9	9 years.	+2.5 S +0.5 Cyl. ax. 75°	+2.5 S.	+1.5 S +0.5 Cyl. ax. 150°	+1.5 S.	No improvement after 21 mos. Has not worn glasses for 1 year.
16	I. S.	8	2 years.	+3.0 S +1.5 Cyl. ax. 75°	+4.5 S.	+2.5 S +1.5 Cyl. ax. 75°	+4.0 S.	Straight after 2 mos. Only child. Doubtful heredity.
17	G. H.	3	6 mos.	+4.0 S.	+4.0 S.	+2.5 S.	+2.5 S.	Straight 6 yrs. On removing glasses eyes converge. Replacing become straight.
18	G. McM	8	Few mos.	+2.5 S.	+2.5 S.	+2.0 S.	+2.0 S.	Straight 1½ years.
19	B. G.	11	Childhood	+2.0 S.	+2.5 S.	+1.5 S.	+2.0 S.	Straight 3 months.
20	E. W.	7	4 years.	+2.5 S.	+2.0 S.	+1.5 S.	+1.5 S.	No improvement. Heredity.
21	M. S.	4	?	+4.0 S.	+4.0 S.	+3.0 S.	+3.0 S.	Good 1 year.
22	O. S.	9	9 years.	+1.25 S +0.25 Cyl. ax. 90°	+0.5 S +0.5 Cyl. ax. 90°	ibid	ibid	Almost straight 6 months.
23	E. R.	5		+0.5 S.	+0.25 S.	ibid	ibid	Straight 7 months.
24	A. N.	10	Birth	+2.5 S +1.0 Cyl. ax. 90°	+1.5 S.	ibid	ibid	No improvement.
25	K. P.	11		+1.0 S +0.75 Cyl. ax. 90°	+2.0 S.	ibid	ibid	Improved 1 year.
26	L. W.	5	3 years.	+3.0 S +0.75 Cyl. ax. 90°	+3.0 S +1.5 Cyl. ax. 90°	ibid	ibid	Almost straight 9 months.
27	G. M.	6	3 years.	+3.0 S +0.5 Cyl. ax. 90°	+2.0 S +1.0 Cyl. ax. 90°	ibid	ibid	Improved 1 year.
28	H. L.	6		+2.5 S.	+2.0 S.	ibid	ibid	No improvement. Wore glasses only 3 mos. Heredity.
29	C. M.	10		+4.0 S +0.5 Cyl. ax. 180°	+2.5 S.	+3.0 S +0.5 Cyl. ax. 180°	+2.0 S.	No improvement. Never wore glasses.

VII. K. B., female, 6 years. Sister E. B. (Case VI.)

VIII. P. B., female, 8 years. Sister E. B. (Case VI.)

IX. L. W., female, 13 years. One brother and one sister strabismus. This is a case of collateral heredity. (1 family; 3 children, all affected.)

X. A. W., female, 3 years. Sister L. W. (Case IX.)

XI. E. W., female, 7 years. Sister L. W. (Case IX.)

XII. L. R., male, 8 years. One brother and one sister strabismus. Three sisters normal. This is a case of collateral heredity. (1 family; 6 children, 3 affected, 3 not.)

XIII. F. R., male, 11 years. Brother L. R. (Case XII.)

XIV. L. E., female, 9 years. One sister strabismus. One brother and one sister normal. Parents normal. Paternal grandmother strabismus. She had twelve children, some with strabismus, number unknown. One of her normal sons had one strabismic daughter and two normal sons. This history is incomplete so far as the direct heredity is concerned, but the indirect heredity is shown. (2 families; 7 children, 3 affected, 4 not.)

XV. H. L., male, 6 years. Four brothers and four sisters normal. Father's twin brother had strabismus, but father was normal. This is a case of indirect heredity. (1 family; 9 children, 1 affected, 8 not.) Case 28 in table.

XVI. A. L., male, 8 years. One brother and one sister normal. One brother strabismus. One brother nystagmus. This is a case of collateral heredity. (1 family; 4 children, 2 affected, 2 not. I exclude the nystagmic child, because while not strabismic, he was certainly not normal.)

XVII. C. B., female. Two sisters normal. Father strabismus. This is a case of direct heredity. (1 family; 3 children, 1 affected, 2 not.)

XVIII. D. K., female, 4 years. Sister Case III.

XIX. L. W., female, 9 years. One

brother strabismus. This is a case of collateral heredity. (1 family; 2 children, both affected.)

XX. A. W., male, 6 years. Brother Case XIX.

XXI. A. M., male, 9 years. Father and paternal grandfather strabismus. This is a case of direct heredity for two generations. (2 families; 2 children, both affected.)

XXII. C. G., male, 12 years. One sister normal. One brother strabismus. One brother weak eyes(?). This is a case of collateral heredity. (1 family; 4 children, 2 affected, 2 not.)

XXIII. C. G., male, 12 years, twin brother Case XXII.

XXIV. G. L., male, 10 years. One brother strabismus. This is a case of collateral heredity. (1 family; 2 children, both affected.)

XXV. M. L., male, 8 years, brother Case XXIV.

XXVI. W. Z., male, 4 years. One aunt and one uncle strabismus. Parents normal. This is a case of indirect heredity (1 family; 1 child affected); also of collateral heredity (1 family; 3 children, 2 affected, 1 not).

XXVII. L. W., female, 4 years. One brother strabismus, two sisters normal. This is a case of collateral heredity. (1 family; 4 children, 2 affected, 2 not.)

XXVIII. E. B., male, 14 years. Mother strabismus, one brother normal. This is a case of direct heredity. (1 family; 2 children, 1 affected, 1 not.)

XXIX. M. C., female, 12 years. Two brothers strabismus, two normal. This is a case of collateral heredity. (1 family; 5 children, 3 affected, 2 not.)

XXX. E. Van H., female, 4 years. One uncle strabismus. This is a case of indirect heredity. (1 family; 1 child affected.)

XXXI. L. H., male, 3 weeks. Mother strabismus. This is a case of direct heredity. (1 family; 1 child affected.)

XXXII. P. D., male, 70 years. Six children normal. This is a case of di-

rect heredity. (1 family; 6 children, all normal.)

XXXIII. H. R., male, 57 years. One sister strabismus. One brother and two sisters normal. This is a case of collateral heredity. (1 family; 5 children, 2 affected, 3 not.)

Of the above cases, Nos. XXII and XXIII were especially interesting on account of affecting twin boys. I do not recall having read of any similar cases, tho they doubtless exist. Case XV also is interesting from the fact that although the father's eyes were normal, his twin brother had strabismus. The taint must have been very weak, as only one out of nine children were affected.

To summarize, there are twelve families showing direct heredity, with 35 children, of whom 15, or 43 per cent. were affected. Seven families showed indirect heredity, with 24 children, of whom 8, or 33 $\frac{1}{3}$  per cent, were affected. Twelve families showed collateral heredity, with 48 children, of whom 27, or 56 per cent, were affected. It would seem from this that both in number of children affected as well as in percentage, collateral heredity is more dangerous. Next in importance comes direct heredity, while indirect heredity affects only one-third of the children in the families related to the patient.

## NOTES, CASES, INSTRUMENTS

### RETINITIS ATROPHICANS CENTRALIS—(HOLE AT MACULA).

CAPT. WILLIAM A. SEDWICK, M. D.  
M. R. C.

BASE HOSPITAL, CAMP GRANT, ILL.  
Private E. W., colored, laborer, aged

26 years, came to the Base Hospital Camp Grant, Illinois, March 5th, 1918, complaining of not being able to see out of right eye; some pain in the eye with twitching of lids and frontal headaches. Vision O. D. was 10/200. Vision O. S. was 20/70. Patient says that vision in right eye one year ago



Fig. 1. Sedwick's case of hole at macula.



was about the same as it was in left eye, 20/70. He admitted that vision had always been bad in both eyes since he could remember. His mother and father both died of tuberculosis, mother living two years after contracting it. Had one sister who died of tuberculosis, living only three months after contracting the disease. One brother living, but delicate. The patient had always been healthy save for an attack of typhoid fever two years before, from which he recovered, except that his left eye remained red for some months, and since then it becomes red every now and again. He denies syphilis, but admits one attack of gonorrhea five years since. He was refracted under homatropin but vision could not be improved in either eye with lenses.

Patient gave the following history: One year ago he was hit over right eye and forehead with a stick of wood 2x4 inches. He became unconscious and remained so for 26 hours. There was profuse hemorrhage from the nose and he vomited a large quantity of blood. He states that he was totally blind in right eye for three weeks. He was discharged from hospital after remaining there for three months. He then did light work and his vision gradually returned to what it is now. He has had constant headache just above the bridge of the nose.

Examination of eye showed cornea normal, pupil considerably dilated. Iris reacted very slightly to light and convergence. A small opacity of lens showed at the periphery, at about eleven o'clock. Vitreous was clear.

At the macular region there was an excavated spot a little more than half the size of the disc, deep red in color and mottled, with sharply cut edges and from a half to one millimeter in depth. Cholesterin crystals were imbedded in the surrounding retina in close proximity to the hole. There were none in the vitreous. There was a large scotoma. The nerve head was normal.

## DATURIN, A CYCLOPLEGIC MYDRIATIC.

EDWARD JACKSON, M. D.

DENVER.

When the present war broke out one of the first drugs to increase enormously in price was atropin. The increase was not due to the fact that it was all made in Germany, but to the dependence of American manufacturers for their supply of a crude drug belladonna upon importation from Europe.

Meanwhile the commonest of weeds on the vacant lots of most of our cities is the *datura stramonium*, or "jimson weed" (Jamestown weed). An unlimited supply of it is at hand. All parts of the plant contain the active principle—the alkaloid daturin, chemically identical with atropin, and pronounced physiologically identical by some of the most careful investigators who have studied the subject. The leaves and seeds were long ago recognized in the U. S. Pharmacopoea.

My own comparative studies of it, published many years ago, seemed to indicate that its actions on the eye were the same as those of hyoscyamin and duboisin. But that, if these were not exactly identical with the action of atropin, that daturin was more nearly similar to atropin than either of the others, in that it acted rather more slowly and was accompanied by less constitutional disturbance.

A good deal of clinical experience with daturin shows that its mydriatic cycloplegic and therapeutic properties are indistinguishable from those of atropin. It is a drug not generally referred to in the text books on ophthalmology, and one that has never been exploited by manufacturers who had succeeded in controlling the market for the raw material. Being sold in comparatively limited quantities its price at the outbreak of the war was five or six times higher than that of atropin. But since the latter has equalled or surpassed it in price there seems to be no good reason why daturin should not come into much more general use.

It is certain that the American supply of the drug could never be interfered with by foreign war. And if it were commonly used the increased demand, with the free supply of raw ma-

terial, would certainly bring down the price. It seems to be simply a question of fashion or custom in the medical profession, as to which they will use or prescribe.

## SOCIETY PROCEEDINGS

### NETHERLANDS OPHTHALMOLOGICAL SOCIETY.

June 9-10, 1917.

DR. NICOLAI in the Chair.

Translated from the *Nederlandische Tijdschr. v. Geneeskunde* by E. E. Blaauw, M. D.

The oration, which C. U. Ariens Kappers gave by invitation "About Phenomena of Neurobiotaxis of the Optical System" has already been published (p. 518).

#### The Dilatator of the Pupil.

NICOLAI spoke on the dilatator pupillae with demonstration of the fibers believed to exercise such a function.

DISCUSSION.—Rochat objects to accepting as the cause of the dilatation of the pupil the rare dispersed fibers of Nicolai. The membrane heretofore considered as the dilatator can be observed especially well in the calf's irides, after the colored pigment layer is removed. A compact membrane of smooth muscle is then seen extending over the entire back of the iris. It is much easier to understand that this membrane produces dilatation of the pupil, rather than the rare muscle fibers of Nicolai. The reaction of van Gieson is not enough to recognize cells as smooth muscular fibers.

Nicolai denies the thinness of the fiber groups which he has described as a dilatator. He seriously doubts the muscular nature of the membrane of Henle on account of the dubious staining, by methods recommended for muscular tissue.

De Kleijn considers the physiologic arguments against the existence of the dilatator pupillae at the location of the earlier investigators not entirely sound.

The objection of an ectropion pupillae during narrowing of the pupil, because then also a contraction of the antagonist occurs, is not real. During late years, from the investigations especially of Sherrington, it seems that during contraction of a muscle the antagonist does not contract, but actively relaxes. It must yet be investigated if this is also valid for the sphincter and dilatator with their peculiar innervation. The existence of a pupillary dilatation at a time that the dilatator is not yet formed, can be explained very well thru loss of tone of the sphincter thru atropin. Nicolai accepts that as a rule tonic tension of the antagonist occurs during contraction of a muscle, and that also an innervation of the dilatator occurs during contraction of the sphincter.

De Kleijn considers this opposed to Sherrington's investigations, and he can add the observation of an active relaxation of the internal rectus in nystagmus, accompanied with the contraction of the external rectus.

#### Panophthalmitis from Gram-negative Diplococci.

J. van der Hoeve observed a 14 year old boy with a rather mild conjunctivitis, in which abundant diplococci were found in smears which proved in cultures gonococci. After one day of treatment no gonococci could be found, and after 5 days the boy was entirely well. He points out the importance of bacterial investigation, as this boy could very well infect people with less resistant conjunctivas.

He then demonstrated Gram-negative diplococci which have not before been described in connection with the eye. These had produced in one child

a panophthalmitis of one eye, and perforating keratitis of the other; and in another child of the same region a panophthalmitis of one eye. They appear different in cultures from meningococci. They grow slowly and form on agar-agar at 37° mucous glassy transparent cultures. Bouillon becomes turbid at 37° in 48 hours; blood serum retards the growth (Prof. Klein). They are not pathogenic for white mice, for the body. For the eyes, however, they are very dangerous. Scratches over a rabbit's cornea with an infected needle produce keratitis. Intracorneal injection produces keratitis with iritis, which always recovers spontaneously. Injection in the vitreous produces serious panophthalmitis within 24 hours, followed by swelling of the bulb and perforation. The diplococcus from the conjunctiva, cornea and vitreous of the infected eyes can again be cultured.

The only known organism where-with this diplococcus corresponds, is the diplococcus mucosus Leipzig, described by Stephan, who does not mention it as the cause of ocular affections.

DISCUSSION.—Rochat asked if we have to deal with a new organism.

Van der Hoeve confirmed this. He also mentioned that the influenza bacillus of Pfeiffer has been left more in the background in later years.

Kuynders asked Prof. van der Hoeve if he had seen a case of panophthalmitis in cerebrospinal meningitis, where we must admit that the inflammation is caused by the Gram-negative meningococcus.

Van der Hoeve has lately observed two such cases; they originated endogenously. The meningococcus in the conjunctival sac is on the contrary usually nonvirulent.

### **Crystalloid Formations in the Retina with Disturbance of Field of Vision.**

P. J. Waardenburg was consulted by a 21 year old lady, who did not see well with L. E. since some years ago. R. E. is normal. Vision, L. E., fingers at 1.5 m.; no improvement with lenses. No general disturbances, nor hereditary ones. The disc in L. E. is not sharply limited with temporal paleness. In its center is

a white tissue, which continues as a strand covering the inferior temporal artery for a length a little longer than the disc diameter. A white spot touching the disc downward and toward the nasal side has a size about 4 to 5 times the disc and shows a somewhat irregular, nonpigmented margin, while it is not elevated above the surroundings. The inferior nasal artery courses over it giving off branches, which are directed nasally. Also some very fine nasal arteries pass over. They are already thin outside the focus on the disc.

The surface looks craterlike. It seems to consist of a number of round globules and pits, separated by furrows and somewhat elevated walls. The color is china like glossy, white to blue white. The pits and globules are certainly not deep and high. The vessels which cross them do not show curves, nor where they leave the focus and pass in the retina. The yellow spot looks normal, with rather few vessels. The patient does not know if she ever saw with L. E. She is able to fix the center of the perimeter, sees people for their upper part very indistinctly. Color-discs of 1 cm. are recognized at  $\frac{1}{2}$  m.

The field of vision is concentrically limited: a distinct difference exists between the part above and the part below the horizontal raphe of the retina. No colors are observed in the part above the raphe, while the white becomes at once very indistinct. In the lower part of the field the color limits are nearly normal. An absolute paracentral scotoma is present, which is broken thru toward the periphery. This compasses the entire papillo-macular bundle and also the disc, and is much larger than the enclosed retinal focus. The limits of the absolute scotoma are given very accurately, the lower border goes to near or in the fixation point. A relative central scotoma is present. The upper part of the visual field consists therefore of two parts, one absolute scotoma going out from the papilla, which is connected with the peripherally limited part of the field, and one outside relative scotoma. The fun-



dus shows only a juxtapapillar change, but no change which can account for this disturbance of the field.

For two years the picture has not changed; now a swelling of the papilla has appeared, so that the margins are more hazy and a retinal hemorrhage is seen about three disc diameters below the papilla, at the side of which membranes have formed which hang from the retina in the vitreous. Also thread-like opacities are seen in the vitreous, which are movable, most probably a result of the old condition. Treatment has had no success, which could be expected: Pirquet test and blood Wassermann negative. The described retinal focus has the most resemblance to the description of formations in the disc given by Niëls Höeg (von Graefe's Arch. f. Ophth. Bd. lxi, 1909, 355-389); and considered as drusen of the optic nerve head, which anatomically seem to be amorphous hyalin masses, without cellular nature and very slow growth.

Waardenburg has formed the following idea of the course of the process: At some indefinite time after birth the L. E. has become affected with a serious neuritis, which being probably also retrobulbar, produced limitation of the visual field thru destruction of the papillomacular bundle, and the directly contiguous fibers, so that the fovea centralis also became affected. These fibers are not entirely destroyed as a certain amount of central vision has remained. From the papilla along a vessel a retinitis proliferans has developed, which proves the intraocular progress of the process. This is also proved by the large crystalloid focus in the retina next to the disc. The destruction became still larger thru this focus. Then all nervous elements have disappeared or have a weakened function peripherally from the focus. The etiology is obscure.

The case completes the observation of Niëls Höeg as it describes a crystalloid focus in the retina only, next to the papilla and also makes it clear that the focus must be considered a complication.

### Influence of Calcium Chlorid on Experimental Conjunctivitis.

A. DE KLEIJN and G. TEN DOESSCHATE. It is a well known fact that calcium chlorid exercises an influence on the formation of exudates and transudates. Experiments with instillation of oleum sinapis or abrine solution in conjunctival sacs of rabbits, with the presence of much calcium chlorid in the organism, showed absence of the normally present irritability of the mucous membrane. Calcium lactat comes next to the chlorid. The protecting action appears two hours after subcutaneous injection, which action lasts only 24 hours. Strontium, in many respects related to calcium, does not seem to possess this action.

This peculiar influence of calcium chlorid on the conjunctiva was demonstrated in the class in pharmacology at Utrecht by Prof. Magnus and Dr. Storm van Leeuwen, when it was found that the animals treated with calcium chlorid with later instillation of oleum sinapis generally acquired panophthalmitis with consequent phthisis.

The speakers have repeated these experiments. At 1 p. m. 5 cm. of a 5 per cent solution of calcium chlorid per kilogram was injected subcutaneously in the rabbit. This injection was repeated 4 hours later, and the next morning at 8 o'clock. One hour later a little oleum sinapis was put in the conjunctival sac. The animals, which had received no calcium chlorid, showed a strong chemosis, and an extensive defect of the corneal epithelium; which however healed quickly, leaving no signs except in one case where a corneal macula remained. The animals injected with calcium chlorid, hardly showed any reaction to the oleum sinapis. But a severe inflammation occurred later, which progressed in one case to panophthalmitis. A number of eyes were enucleated at different times after the treatment and showed the following: The conjunctiva of a rabbit treated showed no changes except slight redness. A day after the instillation there was a corneal ulcer, and, microscopically, an extensive destruc-

tion of the corneal epithelium. A rabbit treated in the same way showed later a severe ocular inflammation, and the eye enucleated after 8 days, while the cornea was very opaque, and pus in the anterior chamber, showed microscopically extensive loss of corneal epithelium, and numerous polynuclear leucocytes in the corneal tissue, anterior chamber and iris. The posterior segment of the eye was lost. Animals not treated with calcium chlorid reacted with severe chemosis, which showed in the specimen on the same day only much conjunctival swelling. An eye enucleated on the second day showed purulent secretion and extensive loss of corneal epithelium, and a marked infiltration of cornea and conjunctiva with the absence of epithelium. After 9 days the cornea was again nearly clear, only some leucocytes and small vessels being found. Later eyes show no more changes.

These observations show the need of care in the use of strong remedies in the eye, after the use of calcium. Absolute conclusions cannot be drawn as the calcium was given subcutaneously.

### **Chronic Headache as an Asthenopic Symptom.**

J. P. VAN DEN BRUGH treated of muscle imbalance and the symptoms produced by muscle anomalies. He thinks that the chief primary cause is an abnormal insertion of the muscles in the globe. He considers particularly the disturbances due to a low degree of esophoria. Even two degrees requires great exertion of the divergence. The sufferers with esophoria and hyperphoria have those different complaints, which are so well known in the United States for the last twenty years. He has had 58 cures in 71 cases. The prisms with the base out should be put on directly in the morning and constantly worn during the day. The highest prism given was of 5 degrees divided over the two eyes. Suggestion can be excluded. Cyclophoria is very difficult to treat. The family physician can find out if the eyes are the cause of the headache by letting his patients go around with one eye bandaged.

DISCUSSION.—Verwey is convinced that prism glasses often can do much good, but we should not forget that many people have latent disturbances of muscle balance without trouble. Some years ago he investigated the influence of the field of regard on the position of equilibrium of the eyes, when he found that heterophorias of low degree can be corrected easily thru inclinations of the head. It should not be enough to determine the latent positions, but we should try to explain them. A direction could be found in the important facts elucidated by Ariöns Kappers, especially the connection between the place of the nuclei of the eye muscles and the fasciculus longitudinalis posterior, which controls the direction of regard and of the nuclei of the vestibular nucleus.

With the instrument of Hess, latent disturbances in different directions of regard can be easily demonstrated. If now the position of the semicircular canals in regard to the direction of gravity has an influence on these heterophorias, then another figure must be found with different positions of the head in regard to the vertical line, with the understanding that one must go out from the primary position with regard to the orbit. Perhaps such investigations would help us in understanding the causes of strabismus.

Lans has for half a year had his attention drawn by van den Brugh to the favorable results of prismatic lenses, with beneficent results for his patients. Van den Brugh wishes to know if attention is paid to symptoms of functional nervous diseases.

Van der Hoeve found many imbalances in normal students; as a rule latent convergence for far-off, and latent divergence for near by seeing. He thinks that the disappearance of the headache after closure of one eye is difficult to understand as a symptom of fatigue; one should in such a condition expect rather a slow amelioration.

Nicolai points to night headache, which could raise a doubt as to the connection with these disturbances of the muscle balance. He also has seen cures from wearing prismatic lenses.



Waardenburg asks if van den Brugh has any experience regarding patients with exophoria, suffering with headache, where the exophoria from time to time becomes manifest strabismus, where therefore an insufficiency of the convergence is present.

Otto Roelofs has done more than 250 determinations of the rest-position, which show the great multitude of deviations and the large amount. He found the same as van der Hoeve in students. In the polyclinic patients he found as a rule a divergent rest-position. He was able to explain this difference between the students and the dispensary patients only by the influence of their way of working.

Van den Brugh in replying mentions that large deviations of the rest-position are found without complaints. These appear as soon as the compensative power becomes lacking. He has no experience regarding the position of the field of regard or the deviation of the rest-position. He would recommend for a strong latent divergent strabismus the use of prisms. It was interesting that not only sufferers with continuous chronic headache, but also those who get a headache in church or in the theater or in a movie, were entirely cured by prisms.

Prof. van der Hoeve then showed the instrument of W. R. Hess which is a very handy instrument for the diagnosis of deviations of ocular muscles, especially paralyses.

The celebration of the twenty-fifth anniversary was more specially held during the meeting, when the president recalled in general the founders, those who had died and the work done. He then gave the floor to one of the founders, the honorary member Dr. F. D. A. C. Moll, who gave the solemn oration, commemorating the first constituent meeting on June 12, 1892, at Rotterdam. The Society began with 34 members and counts now 85. He recalled the 16 members who have died, and then gave a rather general talk, insisting on the value of the esthetic and ethical education of the physician; how the university does not develop this and how important it is as the phy-

sician is for all a man, who should lead on account of his position and scientific education. He then mentions the revision of the educational career, which is in prospect and that the humanistic education has values so that the study of the old languages should not entirely be thrown overboard.

Dr. G. F. F. Rochat gives a historical picture of some three centuries ago of the ophthalmologist, following the *Ophthalmodouleia* of George Bartisch, which appeared at Dresden in 1583, a book that still a century later was reprinted.

### CHICAGO OPHTHALMOLOGICAL SOCIETY.

Clinical Meeting, May 13, 1918.

President DR. HEMAN H. BROWN in the Chair.

#### Sympathetic Ophthalmia.

DR. THOMAS FAITH reported the following case: D. S., Italian laborer, age 38. This patient, whom some of the members had previously seen, was injured by a foreign body in 1915. He was under the care of an ophthalmologist for about two months, and was discharged as recovered or rather out of danger, as the eye was quiet. However, he noticed that his vision was gradually failing, and on July 24, 1915, he applied to the eye clinic at the Illinois Eye and Ear Infirmary for treatment. He saw Dr. Robert Von der Heydt, who found vision in the right eye 20/30; in the left eye 15/200. A diagnosis was made of a piece of steel in the vitreous of the left eye.

For some reason the patient did not return to the infirmary and received no further attention until January 23, 1918, when he was sent to the speaker on account of a slight injury to the left eye, caused by being struck with a piece of ice. There was no abrasion of either the lid or eyeball, but a contusion of the upper lid and an ecchymosis of the conjunctiva. The patient complained of increased cloudiness of vision, which at this time was light perception only, his pupil was fixed and would not dilate with cocain and homa-



tropin and his tension was 48 mm. He did not complain of pain and there was no ciliary tenderness.

He was immediately sent to the hospital and was put upon hot applications, dionin 5 per cent, and salicylat of soda. After a few days of this treatment it was decided to do iridectomy, thinking the patient had a secondary glaucoma due to annular posterior synechia; and as he had been told by the patient, that the gentleman who first saw him had radiographs made, and assured him there was no foreign body in the eye. The above information was obtained after he had done the iridectomy, and it had not relieved the tension as he had anticipated. Accordingly, X-ray and Sweet localization showed a foreign body in the anterior segment of the eye.

He showed this case at the March meeting of the Society and two days later he enucleated the eye. On March 29th the patient complained of pain in the right side of the head, and there was some injection of the right eye, but not pronounced and not deep. There was no tenderness in the ciliary region and no pain in the eye. The pupil dilated fairly well with cocain and homatropin. There were some deposits on Descemet's membrane; vitreous cloudy; vision 20/40 with correcting lens. Patient was given salicylates gr. xxxx, inunctions of mercury, gr. xx per diem. Blood count at this time showed a marked increase in the lymphocytes. The treatment was continued, both salicylates and inunctions being increased in amount. The patient had very bad looking teeth. They were covered with tartar, and the speaker advised that they be scaled so that the gums and teeth could be kept clean. This was done, and it seemed to have a marked influence upon the eye condition as improvement was rapid afterwards. The vision has never gone below 20/60 and it is now 20/20 with correction. The deposits are disappearing from Descemet's membrane, and the patient is going to have a good eye, a rare result after sympathetic disease.

In looking over the literature, the speaker has found that Jampolsky in 1915 reported eight cases of sympathetic ophthalmia, which occurred in the Fuchs clinic after enucleation of the injured eye. In one of these the eye was enucleated 18 days after the injury, and the sympathetic disease began 12 days later. The longest period after enucleation in which sympathetic disease began was 38 days, twenty-nine days having elapsed between the time of injury and enucleation.

In addition 33 cases are gathered from the literature. The summary of ultimate results in these cases fully supports the conclusion of the Committee of the Ophthalmological Society of the United Kingdom, that after such removal of the injured eye, the prognosis is much better than where the sympathetic disease has appeared before removal of the injured eye. Of the whole group, 60 per cent recovered good vision.

DISCUSSION.—Dr. M. H. Lebensohn stated that he had had a number of cases of sympathetic ophthalmia. One he recalled in particular was a boy six or seven years old, who was brought to the Illinois Charitable Eye and Ear Infirmary with a history that the boy's left eye was hurt about four and one-half weeks ago in playing with a brother. How the accident happened the mother could not tell, only she noticed that he could not see with that eye. There was a small scar in the lower border of the cornea. The eye was not red or painful at any time. On examination he found not only was the left eye (the injured eye) blind, but there was a fully developed sympathetic ophthalmia in the right eye. The following day the left eye was enucleated, and half of a pearl button was found in the vitreous. The enucleation did not stop the progress of the sympathetic disease, and the boy in the course of about three or four months became totally blind.

The only thing that the speaker found during the treatment of this case, and several others cases he had treated, that gave even temporary relief, or that seemed to stay the progress

of the disease for a time was injections of cyanid of mercury, 1-1000 injected both in the orbit and in the subconjunctiva. He advised the members to try this agent in addition to other means of treatment.

Dr. Michael Goldenburg, in referring to the case of Dr. Faith, stated that possibly better results were obtained following enucleation previous to the onset of the sympathetic ophthalmia. He had a case on his hands now that he had seen off and on for seven or eight years. A little girl in returning home from school passed near a bonfire, some boys threw bullets into the fire, causing an explosion. A piece of shell entered her eye. She was brought to the Infirmary in a few hours thereafter and within 24 or 48 hours the eye was enucleated. About 16 or 18 days later sympathetic ophthalmia developed in the other eye. For a period of six or seven years she had had 12 or 18 attacks of sympathetic ophthalmia. These attacks had varied in their severity. At times her vision in that eye became absolutely nil. Even perception of light was gone. She had had on three or four occasions optic neuritis.

It was a question whether this was sympathetic ophthalmia. Every sort of examination, test, X-ray, every laboratory method known, had been tried to ascertain whether any other factor could have influenced this condition; but he had not been able to find out anything definite. The vitreous humor was filled with an exudate to such an extent that the speaker could not get the light reflex at the time, and in the course of a few weeks or months it would clear up, so that he could not find any evidences of the previous condition. He had seen the patient within the last two months, and with correction, which was rather high, three or four diopters plus, she got 20/25 vision. She had come back with attacks so frequently that he would not be surprised to see her with no vision at any time.

Dr. Heman H. Brown asked whether in these various attacks the treatment was uniform.

Dr. Goldenburg replied that at first he tried treatment similar to that mentioned by Dr. Faith. He gave the salicylates and mercury; he also gave potassium iodid, prescribed sweats and purges, then subconjunctival injections, and even tuberculin. A tuberculin test was made, and the treatment that gave the best results was inunctions of mercury. He excluded very carefully luetic infection. Her sinuses were X-rayed, and her teeth and tonsils were carefully examined.

Dr. Robert H. Buck stated that in connection with these inflammatory cases due to local infections, he might cite a case that came into the office recently. This patient had had recurrent attacks of iritis. At the time he came in he had an attack of iritis for two weeks. On examination it was found that the patient had a bridge on one side of his mouth, and one tooth in that bridge was abscessed. Following extraction of the tooth the iritis cleared up in two or three days.

Dr. Thomas Faith stated that most of the severe cases of sympathetic ophthalmia were in children. He did not believe that we got any such results in children as in adults. He did not recall ever seeing a case in which normal vision was recovered, although he knew of a number of cases reported. Most of the cases he had seen had been in children.

If one studied all these cases of iritis, he could not help but be impressed with the fact that many of them had two or three different elements in helping to cause the trouble. One saw so much in the literature these days regarding the influence of focal infection in producing uveitis, that one was likely to conclude that he had to completely rearrange his percentages. These cases in Fuchs' clinic had been studied carefully, and whether they were all adults or children, he was not able to say.

The Committee of the United Kingdom, that had gone over the subject very thoroughly had come to the conclusion that after the removal of the injured eye the prognosis was much better than where the sympathetic

disease had appeared before the removal of the injured eye. Certainly, we could not promise patients that we could save them from having sympathetic ophthalmia. We could promise them, in all probability, that the sympathetic disease, should it occur, would be less severe than if the eye was allowed to remain.

### A Case of Ectopia Lentis with Family History.

DR. WILLIAM K. SPIECE reported the following case:

H. C., aged 7. His school teacher noticed his poor vision and sent him to the school physician. The physician noticing the iridodonesis referred the boy to the speaker as an interesting eye case.

On examination his vision was found to be R. 5/100; L. 5/100.

Iridodonesis was very noticeable, especially following movements of the eyeball. The anterior chambers were deep, more so on the aphakic sides. With oblique illumination, both lenses were seen to be dislocated upward and outward, leaving a small crescentic aphakic area downward and inward. No zonular fibers were to be seen and the lenses were clear. Following the use of atropin a satisfactory retinoscopic examination of the aphakic area was made, but not of the phakic portion.

Glasses improved his vision as follows:

R. + 10.00 D.  $\odot$  + 2.00 D. c. ax.  $90^\circ = 20/200$ .

L. + 13.00 D.  $\odot$  + 1.00 D. c. ax.  $90^\circ = 20/100$ .

The nasal side of each fundus could be seen fairly well. Aside from the right disc appearing somewhat pale, they were negative.

About two weeks after the use of the cycloplegic the pupils were again normal in size. His vision with glasses was then: R. 20/200; L. 20/100.

His mother presented a pair of spectacles which she said had been prescribed by a physician about a year ago, but they had not been satisfactory. They were: each -1.50 D.

His mother said that her eyes were similar to her son's, and on examination such was found to be the case. She also reported the case of a sister whose eyes were in a similar condition.

Mrs. Albert C. (the mother), aged 38. On examination iridodonesis was noticed following ocular movements, and the cover test showed an exophoria of 3 mm. The vision is R. E. 10/65; L. E. 10/200.

Following the use of homatropin the lens of the right eye was seen to be dislocated upward and outward. The left lens was in position. After retinoscopic examination glasses improved her vision as follows: R. + 5.00 D. = 20/50; L. + 5.00 D.  $\odot$  + .50 c. ax.  $90^\circ = 20/20 -1$ .

The examination of the left fundus showed a disseminated choroiditis with an atropic area just above and to the nasal side of the disc which, on first appearance suggested a movable lens.

Elsie C. (sister), aged 9. R. 20/32; L. 20/65 -1. Ophthalmoscopic examination of the left eye revealed a bleb or vesicle about 2 mm. in diameter, centrally located on the posterior surface of the lens.

Mrs. G. aged 27 (the aunt; mother's sister). Examination reported by Dr. E. A. Westcott, Manistique, Michigan. Left eye, divergent squint about  $30^\circ$ . Both anterior chambers deep. Both irides tremulous. R. 8/100 with + 8.00 D. = 20/60; L. 2/100, not improved by glasses. On dilating the pupils one saw with the ophthalmoscope the upper outer edge of each lens. The right lens was transparent, and in the left there was beginning cataract. Could only see the fundus past the edge of the opaque lens. She had a son, aged 6, whose eyes were in a similar condition.

Genealogy of H. C.:

Six (6) children, 2 brothers and 3 sisters.

Brother, aged 12; V., R. and L. 20/20; Hm. .25.

Brother, aged 10; V., R. and L. 20/20, Hm. .25.

Sister, aged 9; V., R. 20/32; L. 20/65 (L. Post. Polar vesicle).



Sister, aged 7; V., R. and L., 5/100.  
Sister, aged 5; V., R. 20/30; L., 20/50 neg.

Sister, aged 1;  $\frac{1}{3}$  negative.

H.'s father, eyes good.

H.'s mother, eyes poor (same condition, unilateral).

H.'s maternal uncles (3)—

Aged 36, living, eyes good.

Aged 20, dead, eyes poor.

Aged 4 mo., dead.

Mrs. C., 38.

H.'s maternal aunts (4)—

Aged 33, living, eyes good.

Mrs. B., aged 27, living, eyes poor; son aged 6; poor eyes.

Aged 20, living, eyes good.

Aged 6 mo., dead.

H.'s maternal grandfather, aged 60, living, eyes good (has no brothers or sisters).

H.'s maternal grandmother, 52, dead, eyes good (one brother only; good eyes).

DISCUSSION.—Dr. Frederick D. Vreeland mentioned a case that Dr. Joseph Beck reported at the Cook County Hospital. In this case the lens was dislocated, and he described the other eye as having the lens outside of the iris against the cornea and the lens entirely clear. Dr. Vreeland did not recall having seen such a case, neither did Dr. Darling.

Dr. Lebensohn thought Dr. Woodruff had operated on a case of this sort at the Infirmary some three or four years ago in which he delivered the lens. In this case the condition was congenital. The patient was 11 or 12 years of age.

Dr. Vreeland stated that this patient to whom he had referred had been under the observation of Dr. Beck for two and a half years.

Dr. Robert H. Buck recalled a case that came into the Infirmary about a year ago, in which there was a dislocation of both lenses, which were floating free in the vitreous. As the patient moved the eyes, the lenses would come up before the pupil and then drop back again, so that one could just see the upper edges of the lenses.

Dr. William K. Spiece, in speaking of the cause of this developmental defect, stated that in reading the literature he found that some of the writers had endeavored to put forth ideas as to the cause. Two of them assumed somewhat the old woman's idea that the cause for all these defects was similar to that of birthmarks. One writer in the Wisconsin Medical Journal, in reporting a series of cases of ectopia lentis in a large family, gave the father's idea as to the cause of it and it was simply this: In his earlier years, when he first got married, he was quite poor, and the mother had to do the work, the drudgery of the household, and for that reason it left an indelible impress upon the children. This explanation of the cause did not appeal to the speaker very much, any more than the old woman's idea of the cause, birthmark.

Several other writers had advanced ideas along the line of eugenics which appealed to him. Whenever any one began to discuss eugenics they referred to Mendel's law. Mendel was a naturalist. He did his work principally in the garden. He was ingenious and conducted a series of experiments with different vegetables unselected and worked out the different characteristics of plants, and from these experiments he developed the so-called Mendel's law. According to Mendel, we have the traits, dominant characteristics and recessive characteristics, and one might say in this instance a normal eye would be the dominant characteristic, and the abnormal eye would be the recessive. Mendel laid down the law that the recessive trait bore the proportion of one to four to the dominant. Three times normal would develop the dominant characteristics, and once a recessive, and in all these cases that had been shown the proportion came close to that, about one to four.

One or two other writers stated that this never occurred unilaterally. But here was one case where it did occur unilaterally. Parsons in his pathology had said it occurred unilaterally, and cited such a case. The sister had a posterior polar vesicle which was the same type.

However, it had not progressed so far as in the other cases, but it was undoubtedly of the same type. The trouble was with the development of the zonular fibers, the suspensory ligament of the lens. There was no trace of any zonular fibers, and the speaker thought that this case was of the same type as in the mother, the boy, the aunt and cousin. Then possibly one thing more might be said, namely, what were we going to do for it? Most of the writers contend that if there be useful vision it was better to leave them alone. If their vision was very poor, some authors recommend needling.

Dr. Michael Goldenburg spoke as to what should be done for these cases; saying, that some maintained that vision was not improved by operative procedure, and further that the function of accommodation was lost by this interference. He was firmly convinced that given a case not possessing useful vision, by which he meant 20/100 or better, we should resort to dissection of the lens. He felt sure that a majority of these cases would show an improvement in vision in time. He had had a number of such cases that justified such a deduction.

With reference to the development of vision, he reported the case of a young man who had been under his observation for about ten years. When he first examined him his left eye disclosed a marked choroiditis, persistent pupillary membrane, and coloboma of the iris, with no vision. In the right eye the fundus was negative, with 20/100 vision, improved to 20/50 with glasses. Today the patient had better than 20/20 vision in the right eye, and no improvement in the left. He was now one of the leading professional baseball players in the big league.

He recalled the case of a young lady who was now 28 years of age. She was under the care of the late Dr. Beard some twenty odd years ago, who at that time performed an optical iridectomy in each eye, but did not touch the lenses. He saw the young lady first when she was 23 years of age; she had the mentality and facial expression of a child of 12 or 14, and would sit on the

floor and play with the children; she paid no attention to her appearance, and did not seem to take any interest in things expected of one of her age. Her vision at that time was counting of fingers. Today she had 22/100 in each eye and was able to come down town alone. Her appearance, her mentality, and her interest in things about her were most gratifying.

### **Buphthalmos.**

Dr. Robert H. Buck reported the case of a child that was brought to the Infirmary when six months of age. The buphthalmos was pronounced. Both corneas were hazy. The child seemed to notice bright things. If one held a bunch of keys she would reach for them. On account of the condition seemingly progressing and being likely to result in total blindness, both eyes were trephined. The result was gratifying, in that the corneas cleared up in a few weeks. At present she was 18 months of age, could walk around the room, and avoid striking the furniture, or she would approach a person when called. He did not take the tension at the time of the operation, and since then he had not felt justified in anesthetizing her to get the tension, so it had not been done. So far as one could tell from external examination, the eyes seemed clear, and the patient seemed to be developing more vision as time went on. He did not know exactly what the diameter of the cornea was at the time he operated. But it was his impression that the cornea in each eye was getting larger within the last three or four months. [See below.]

### **Peripheral Iridectomy Combined with Scleral Trephining.**

DR. M. H. LEBENSOHN stated that in reporting this case he had nothing especially new to offer excepting the broad peripheral iridectomy combined with scleral trephining, which he considered a more desirable and satisfactory operation, and was equally useful in acute and chronic glaucoma. He had operated by this method on five patients; on four, one each eye, and on this patient whom he was presenting tonight on both eyes. Mrs. E. B.,

aged 55, entered the Infirmary February 10, 1918, with a history of progressive failing vision in both eyes for about a year. The tension of the right eye by a Schiötz tonometer was 80; left eye 60. The corneas were steamy, and the anterior chambers very shallow, and pupils dilated. The fundi could not be seen. Vision in the right eye was 22/100; in the left eye light perception only. The vision gradually improved after the operation and was now for the right eye 20/50 without any correcting lenses; and about 21/120 in the left. The tension taken repeatedly was 21 in the right eye, and 18 in the left. He had had the same favorable results in the other four patients.

Col. Elliot, who popularized the operation of trephining for glaucoma, did not advise iridectomy excepting to cut off the prolapsed iris. It was known that in chronic glaucoma especially many times the tension might remain down for a short time, but it would rise again and necessitate another operation; while if one made a broad iridectomy the tension would remain down permanently and the danger of late infection was not increased because the scleral wound was not any larger than in a simple trephining. Hence, whenever a scleral trephining was indicated in glaucoma, a broad iridectomy should be done at the same time. It was much safer than an iridectomy ordinarily performed, as there was no danger of injuring the lens.

DISCUSSION.—Dr. Lebensohn, in discussing the case of Dr. Buck, stated that he had resorted to scleral trephining in a child a year and a half old. The baby was brought to the Infirmary at the age of seven weeks with congenital cataracts in both eyes. There were repeated needlings in both eyes. She developed buphthalmos in the right eye, and tension was 58. He did a scleral trephining six years ago, saw the child for six months after that, and now he saw the child every few months. Tension had remained very good since the operation. The child had useful vision. The other eye was

repeatedly needled, and there were no complications.

Dr. Thomas Faith would like to know about the character of the glaucoma; and if the doctor had run across any case in which he was unable to deal with the iris on account of adhesions to the posterior surface of the cornea. He recalled one case of scleral trephining which argued strongly for a broad iridectomy. A woman came to him in 1911 with glaucoma in both eyes. He did a double scleral trephining. In one eye he got a good sized opening in the iris. It was a nice peripheral iridectomy. In the other eye the opening in the iris was smaller and could only be seen when the eye was rotated up. The tension in the eye with a larger peripheral iridectomy was always from six to ten points lower than in the other. The size of the conjunctival bleb was always larger in the one in which the peripheral iridectomy was larger. He had seen that case once in two or three months since 1911. She had preserved her vision, although she had had attacks of violent conjunctivitis in which the pneumococcus was found in the conjunctiva, but she had had no trouble so far as deep infection was concerned.

Referring to the case of Dr. Lebensohn which developed buphthalmos, the speaker was under the impression that buphthalmos was congenital, and he wanted to know why Dr. Lebensohn did not classify this case as one of secondary glaucoma.

Dr. Robert H. Buck stated with regard to this case of buphthalmos, he was unable to make an ophthalmoscopic examination, but he could see enough to determine that there was not a cataract in either of these eyes. As to broad iridectomy, he did broad iridectomies in both eyes.

As to Dr. Lebensohn's case, he saw this patient when she first came into the hospital and on examination he found that both corneas were very cloudy. They were now perfectly clear. The iridectomy in the left eye was perfectly clean, that is, there was a pillar to the iris on either side, while in the right eye it seemed the iris had



prolapsed into the trephine opening, pulling up the pupil.

With regard to getting a broad iridectomy thru a trephine opening and getting a good hold of the iris thru the opening, he had used a two millimeter trephine, and in so doing generally found that the iris prolapsed sufficiently so that he could take hold of it, pull it out, and do the trephining quite readily. He had a patient, 24 years of age, with buphthalmos that began in childhood, and at the time he saw her the cornea measured 30 millimeters in diameter and protruded 15 millimeters. The bulging was so great that it was decided to enucleate both eyes because

of the intense discomfort, and vision was absolutely nil.

Dr. Faith, in working on one of the advisory examination boards, stated that he had seen two cases of buphthalmos in men brought up for the draft. One of them was a case on which Dr. Patillo did an iridectomy when the boy was 12 or 14 years of age; and as far as Dr. Patillo knew vision had not deteriorated since the iridectomy was done. Both eyes were involved and iridectomized, and the result was a good one, but vision was not good enough for him to be accepted for the draft.

### ABSTRACTS.

**Collins, J.—The Nervous Manifestations of Syphilis of the Eye.**—(Amer. Jour. of the Med. Sciences, May, 1918.)

The writer gives the results of an analysis of 790 cases of syphilitic disease of the nervous system observed at the Neurological Institute of New York City. One-half of these were examples of tabes and general paresis and in 335 of these 395 cases the size, shape and circularity of the pupil were disordered. He regards disorder of the circularity of the pupil, in the absence of obvious attributable cause, such as iritis, scleritis or similar inflammatory conditions, as suggestive of syphilis; and a warrant for the study of the cerebrospinal fluid, although it must be admitted that such alterations do occur in healthy individuals. Uhthoff found such anomalies in two per cent of 14,392 cases; others who investigated much fewer cases found a larger percentage—Ivanhoff, 9 per cent; Mantoux, 5 per cent; Dufour, 4 per cent.

Collins found Argyll Robertson pupils in 467 of the 790 patients; he considers failure of the pupil to react to light as the only infallible sign of syphilis; in 25 years' experience he has never encountered the Argyll Robertson pupil in a nonsyphilitic individual. He points out, however, that isolated

cases have been recorded by Mees, Margulies, Nonne and others, in which such phenomenon occurred in chronic alcoholics, and in which there was no history of syphilis; and no evidences of its existence were revealed by examination of the blood serum and cerebrospinal fluid. Other instances of loss of the pupillary light reflex have been recorded in syringomyelia by Dejerine and Miraille and others, in disseminated sclerosis by Van Rad, in diabetes by Biermann, in head injury by Guilaïn, Franke and others, and in pineal gland tumor by Southard. The statistics that have often been cited to support the statement that such pupils occur in nonsyphilitics, but in which the blood serum and cerebrospinal fluid have not been examined are useless. It may be said that the Argyll Robertson pupil bespeaks the existence of previous or existing syphilitic disease of the central nervous system, though, like all rules, this one may have exceptions. It is generally held that the prognostic significance of these pupils is grave; and that it heralds, often a long time in advance, the coming of tabes and general paresis, and other serious cerebrospinal manifestations of syphilis; this is not always the case, and the writer cites instances of 22 in-

dividuals who have had such pupils for upward of five years, without any indication of active syphilitic disease of the central nervous system.

Taking up the subject of syphilitic eye muscle palsies, the writer asserts; that the frequency with which functions of the cranial nerves are disordered in syphilis of the brain, has been habitually overstated by writers. In the 790 cases upon which this study is based there was a history of diplopia in 150 cases, i. e., in about 20 per cent; and in only one-half of these were there evidences of third nerve involvement when the patient was examined. In other words, the ocular palsies of syphilis of the nervous system are often transitory and disappear spontaneously or therapeutically. They are often the earliest symptoms, especially of tabes and basilar meningitis. Besides being usually transitory and amenable to treatment they are generally partial; in comparatively few instances are they permanent; in the majority of cases they are not, as formerly held, predominantly of nuclear origin.

Regarding the particular nerve involved, the third was partially or completely paralyzed in 62 instances (on both sides in only 5 examples, contrary to the opinion of Uhthoff that bilateral involvement was almost as common as unilateral). The sixth nerve was affected 31 times in this series of 790 cases; and the fourth nerve was the seat of palsy in only 5 instances. As a rule syphilitic paralysis of the third nerve is not only unilateral but partial. The explanation of this is that the lymphocytic infiltration which constitutes the essential pathologic lesion of syphilis of the nervous system may vary in size, intensity and extent; total paralysis is usually either the expression of gumma which causes compression of the trunk of the motor oculi nerve, at some place during its intracranial transit, or of an extensive basilar meningitis.

Eye muscle paralysis may occur alone or in combination with paralysis of other cranial nerves; sometimes no involvement of the nervous system is found, save an isolated ptosis or abdu-

cus palsy. Oftentimes one finds peculiar combinations of disturbances, that remain after a double-sided ocular palsy; for instance, patients who are unable to look upward, and when they try to do so convergence results, and when they try to converge they cannot. Lipschutz gives the following explanations of this: In these patients there was originally complete oculomotor paralysis, so that they could neither look up nor converge. As a part of the restorative process new fibers grew out of the central stump. These new fibers did not, however, reach the muscle for which they were originally intended; they were deflected, and instead of going to the rectus inferior they went to the rectus internus. When the patient makes the effort to look upward the impulse goes thru the internus instead of the inferior. This interpretation of Lipschutz seems to have been accepted in a way by ophthalmologists. But it is not characteristic of syphilitic lesions. It may occur in any disease that destroys the roots of the nerve while the nuclei are preserved.

Regarding syphilitic infection of the optic nerve, Collins found that this occurred more frequently than was expected, and in 95 cases of the entire number there was disease, either inflammation, choked disc or atrophy, postneuritic or simple. It is strange and inexplicable that optic nerve atrophy is rarely observed in general paresis, and this was illustrated in the writer's series of cases by finding but one instance of this anomaly. The affection of the optic nerves in syphilis of the brain, whether it be choked disc, optic neuritis or atrophy, may be the result of increased intracranial pressure, the direct effect of the meningeal proliferation or pressure from a gumma. It may likewise be due to syphilitic disease of the brain, especially of the anterior quadrigeminal or the geniculate body. Involvement of the trunks of the optic nerves may take place at any part of their course, but they are most liable to be affected at the chiasm, and the changes that take place in the fields as well as in the nerve itself are most variable.

Finally the writer takes up the question of the amenability to treatment of the nervous diseases of the eye due to syphilis. He has never seen an instance of disorder of the pupils caused by syphilis of the nervous system disappear spontaneously or under treatment. Some of the muscle paralyses yield to treatment readily, others are most rebellious. The important matter is to distinguish one from the other. "In a general way it may be said that the vast majority of cases of muscle paralysis associated with symptoms that justify the diagnosis of meningitis, especially those coming on abruptly, yield to treatment or recover spontaneously. On the other hand, those due to nuclear lesion (which are apt to develop insidiously) are rebellious and unamenable, but the majority of permanent ocular palsies are not of nuclear origin. Some of those that are nuclear at the end of life may have once been radicular. Some eye palsies are dependent upon destructive lesion of nerve bundles that cannot be regenerated. The longer an ocular palsy has been in existence the more unfavorable, as a rule, is the outlook."

Optic neuritis and choked disc, unaccompanied by symptoms of increased intracranial pressure, often disappear almost magically under appropriate treatment. Collins has never seen a case of primary atrophy yield to treatment, nor has he seen optic neuritis develop after the use of salvarsan. In conclusion he calls attention to the fact that ophthalmologists have a unique opportunity to aid in the early detection of syphilis of the nervous system. Patients who show pupillary anomalies, particularly in size, contour and responsiveness to light, should be counseled to report to their physicians for examination of the blood serum and cerebrospinal fluid, with the same seriousness as they are sent for investigation of the urine when retinitis albuminurica is found. No case of disease of the nervous mechanism of the eye that has its origin in syphilis should be considered beyond recovery, or un-

suitable for treatment, save primary nerve atrophy that has gone on to completion.  
C. H. M.

**Wiener A. Bilateral Total Ophthalmoplegia.** Medical Record, 1918, p. 724.

Wiener reports the occurrence of this condition in a patient sixty-seven years of age, with arteriosclerosis and a mild interstitial nephritis. The ophthalmoplegia developed suddenly after an attack of influenza. He believes that such a condition could be due only to a vascular lesion. Blocking of the basilar artery by a toxic arteritis would account for this clinical picture. The prognosis is good, a collateral circulation developing probably thru the circle of Willis.  
F. B.

**Richard. Treatment of Syphilis with Galyl.** (La Clinique Ophthalmologique, August, 1917).

Galyl is a French substitute for arsenphenamin. The author used it with good results in 80 cases. The intravenous injection of strong solutions was employed, using 0.2 gms. of the salt every fourth day in the vigorous cases and only one every sixth day in the poorly nourished cases. In all between 1.60 to 2.0 was given during 35 to 45 days in 8-10 injections. Local reactions were few, except where the cellular tissue was infiltrated. The therapeutic results equalled those of salvarsan, which drug it should replace entirely, being of French discovery and manufacture.  
J. S. W.

**Demaria and Caldora. Movements of Upper Lid with Mastication.** Bol. de la Soc. de Oftal. de Buenos Aires, v. p. 70.

The history of a case of this rare anomaly is given. During rest a slight ptosis existed of the right eye, disappearing and even leaving exposed a part of the sclera, above the cornea, as the inferior maxilla was drawn downward in mastication. The elevation of the upper lid attained its maximum when the jaw was moved laterally in the direction opposite the affected eye. The other ocular muscles were normal



except that the pupil was larger than of the other eye, altho its reactions to light, accommodation, etc., were not impaired. The presence of this anisocoria is the principal interest of the case.

The anomaly is stationary. Sixty-eight cases have been reported to date, the first being that of Marcus Gunn in 1883. All these observations can be divided in three groups. In the first the elevation of the lid is produced when the mouth is opened and the jaw displaced laterally. In the second (less numerous) the levator palpebrae contracts only in opening the mouth; and in the third group only when the jaw is moved laterally.

The most general opinion of the cause of this condition is that the nucleus of the oculomotor is congenitally in relation with the trigeminus, and even with the facial, the movements of mastication being principally commanded by the mesencephalic center which is near the origin of the oculomotor. Lutz, however, opposes this view and holds that the disorder must be located in the subcortical centers. On the ground of the anisocoria observed in their cases, the authors claim that the trouble must reside in the cortical centers near the foot of the frontal convolutions, which are probably connected with each other by Meynert's U fibres.

URIBE-TRONCOSO.

# American Journal of Ophthalmology

Series 3, Vol. 1, No. 9

September, 1918

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

## AN OPHTHALMIC ADVENTURER—JULIUS HOMBERGER.

From earliest colonial times adventurers have sought in the new world a refuge from oppression or an outlet for their energies; and among them have been all sorts of physicians. Few have influenced professional thought more decidedly for a time, or sunk more completely into oblivion afterward than Julius Homberger, the founder, editor, and publisher of the first ophthalmic journal published in the United States. He was a German who came to New York in January, 1861. Of his earlier life little is known, but he was evidently of good education, and of respectable connections in Europe.

Before coming to America, he had published, at Würzburg, a twenty-page monograph on "Spinal Curvature"; and he dedicated his journal "in testimony of the friendship and gratitude of the editor" to Heinrich Schwarzschild in Frankfort on the Main. His familiarity with the work of Graefe, and the extensive transla-

tions from Graefe's writings published in his journal, make it probable that he had worked in Graefe's Clinic. When the supplementary committee on the organization of the Universal Society of Ophthalmology was appointed in 1861, he, with the venerable surgeon, Valentine Mott, was named to represent New York.

In July, 1862, he published the first number of his journal; which was to be issued bimonthly, and called the American Journal of Ophthalmology. The first number contained an installment of a translation of Graefe's article on "Diphtheritic Conjunctivitis and the Use of Caustics in Acute Inflammations," then an article of his own on the "Anomalies of Motility of the Human Eye," followed by the report of the Universal Society of Ophthalmology, that met in Paris the preceding October. Abstracts of articles by a half dozen of the most famous European oculists, bibliographic reports naming different works recently published, a letter from Wecker, and a department of notes and queries made up this first

number. Continuations of the first two articles mentioned, with similar abstracts and reports, constituted the substance of each of the succeeding numbers.

Among the European authorities thus brought to the attention of American readers, in the 256 pages which constitute the first volume, we find in addition to the names already mentioned, those of Bowman, Desmarres, Donders, Galezowski, Liebreich, Pagenstecher, Saemisch, Schweigger, Sichel, Warlomont, and Zander. The only American writer honored with an extended abstract was E. Williams, of Cincinnati.

In the second volume the character of the journal changed. The first three papers were by the editor himself. Then there came two from Dr. E. L. Holmes, of Chicago, and another by the editor; then the portion of a review of Donders' theories regarding astigmatism and cylindrical glasses. The abstracts are from Critchett, Hughlings Jackson, and a symposium on calabar bean. Of the second volume but two numbers appear to have been published.

Why so excellent a journal did not establish itself is largely due to the smallness of the number of Americans really interested in ophthalmology at that time; but is partly accounted for by certain characteristics of the editor. He used its pages for uncomplimentary remarks that must have been exceedingly annoying to the gentlemen mentioned, and to their friends.

There is a severe attack on the book of Dr. Henry W. Williams; most specifically dwelling on the folly of attempting to present the whole subject of ophthalmology in so small a work. Again the editor used the occasion of a paper by Dr. Henry D. Noyes, before the N. Y. Academy of Medicine on the subject of "Effects of Albuminuria in Vision," to comment thus on a case that had been reported to the New York Pathological Society as one of "unsuspected Bright's disease." "We had been consulted by the same patient some days before the general symp-

toms set in, and had diagnosed the disease with the ophthalmoscope alone. The physicians attending his deathbed still found the trace of our activity in the dilated condition of the right pupil of the patient. Again not suspecting the hand of the specialist in want of a drawing for his collection of ophthalmoscopic sketches, they indulged in speculations as to the cause of this extraordinary unilateral mydriasis!"

When he had lived in New York two years he had stirred up the Department of Public Charities and Correction on the subject of establishing special wards in the Bellevue Hospital devoted to diseases of the eye, the ear, the skin and nervous diseases. When the Board, after seeking general information and advice on this subject, decided to establish an outdoor department for such diseases, Homberger wrote thus:

"When we read of the insane measures of the Prussian Government against the freedom and liberty of its subjects, we wonder how it is possible that the many severe teachings which history gave to tyrants are of so little avail, and how it is to be explained that a minority of privileged individuals dares to oppose the enforcement of the laws of liberty and equity. The Medical Board of Bellevue has the enviable privilege of offering a parallel to the excellent Herr von Bismark, by the above resolution. The latter gentleman and his followers despise to listen to the eloquent arguments of the representative of the people, and intentionally ignore the existence of an unabatable popular feeling for liberal institutions, while the Board of Bellevue enjoys its supremacy and does not allow the doctrines of a Graefe, a Toynbee, a Brown-Sequard, or a Hebra, to enter the wards of a hospital."

Dr. Homberger had announced in the first number of his journal his "personal conviction that the progress of medicine and surgery and science in general depends on the cultivation of special departments. We would defend the rights of the specialist in opposition to those who, while they pretend to embrace the whole field of general



practice, also claim to be listened to as authorities on individual branches, and at the same time attempt to throw distrust upon those who hold contrary views."

There were others in New York then actively interested in promoting specialization in medicine. But when on January 9th, 1864, eight men met at the office of Dr. Noyes for the organization of the American Ophthalmological Society, Dr. Homberger was not one of them, and he seems not to have been invited to join in the movement.

In June of that same year the American Medical Association met in New York. Dr. Homberger became a member of the Association, and offered a resolution regarding the relations of specialists to general practitioners. This resolution was supported by Drs. Elsberg and Gardener of New York, and D. H. Storer, of Boston. But it was defeated, and a special committee appointed to report upon the subject.

A year later at the meeting in Boston, Dr. Homberger read an individual report from his committee, favoring that specialists be allowed to advertise although general practitioners should not. When questioned, he frankly admitted that this report had not been submitted to his colleagues on the committee, because he believed that they would not sign it. Dr. H. R. Storer also read an individual report favoring specialism but opposed to such advertising by specialists. The third member of the committee, Dr. Hooker, of Connecticut, felt that he had not had sufficient opportunity to consider the matter. After debate the subject was referred to the Committee on Medical Ethics.

In 1866, at the meeting of the A. M. A. in Baltimore, Dr. D. H. Storer made specialization in medicine the subject of his presidential address, reviewing the common arguments and prejudices against it; and in conclusion welcoming the assistance of the specialist in the work of the medical profession. From the Committee on Medical Ethics, Dr. Hooker read the majority report adverse to the recognition of exclusive specialism, while exploiting a

partial specialism. But Dr. Henry J. Bowditch, of Boston, read a minority report, a direct plea for specialization and progress. Both reports were published without final action by the Association. During the discussion thereon, Dr. Homberger was permitted to make a personal explanation with regard to advertising; what was the nature of this explanation does not appear from the record. But evidently he had the courage of his convictions with regard to advertising, or, more likely, a good deal of indifference to the views and standards of his professional colleagues. The Medical and Surgical Reporter of Philadelphia, and from it the Boston Medical Journal (Vol. 74, p. 366) quoted a few months later, his advertisement from a Philadelphia newspaper, proclaiming in distinctly quackish phraseology his special skill.

Somewhat later he went from New York to New Orleans, where he published in 1869 a 20-page pamphlet entitled "Batpaxomyomaxia; a Fight on Ethics." At the close of the meeting of 1866, Dr. Homberger tendered his resignation from the American Medical Association. This was not acted upon until 1868, when the subject was brought up and he was expelled from the Association. At the same meeting the following resolutions were adopted:

Resolved, That this Association recognizes specialties as proper and legitimate fields of practice.

Resolved, That specialists shall be governed by the same rules of professional etiquette as have been laid down for general practitioners.

How long Dr. Homberger lived, when and where he died, whether he continued to practice in America, or went back to Europe, disgusted to learn that "Order is Heaven's first law" even in new countries, we have been unable to learn. He is not the only man coming out of Germany expecting immediate recognition as a being of superior order, who has been disappointed in that expectation. But his principal achievement in starting an American Journal of Ophthalmology

and the good judgment shown in his selection of the material he published make it desirable that Americans should know a little more about him. When Dr. Alt started his American Journal of Ophthalmology, he did not know that the name had been used before, or of the existence of his compatriot, who had disappeared from professional view 15 years earlier.

In his fair professional education, his disposition to travel, and his inclination to charlatanism, Dr. Homberger reminds us somewhat of the English adventurer "Chevalier Taylor." But like most such adventurers, he fell far short of Taylor's social and financial success.

E. J.

### FRANK CHISHOLM TODD.

#### AN APPRECIATION.

Todd of Minneapolis has passed; dead in the line of duty from pneumonia, contracted in our American Army service while in active performance of his duty; a sacrifice to the Moloch of war, passing away, however, with his immediate work nearly completed and well done. We miss him greatly; we remember the man that he was; we remember his accomplishments; his achievements and the great help that he has been to the progress of ophthalmology. Minneapolis loses one of its foremost citizens; ophthalmology sees a shining light quenched; the Army loses a valuable officer; his students an example to which they may aspire; his friends a delightful companion; and his family a devoted husband and father. I knew him well for many years. I loved the man and admired his character as well as his attainments. Vale Todd! Moritirur te Salutant!

H. V. W.

### A PLAN FOR THE MOBILIZATION OF PHYSICIANS.

(1) Commission all physicians within the draft ages; if feasible all up to the highest age limit allowed for voluntary enlistment in the Medical Reserve Corps. Exempt only those actu-

ally physically incapacitated to practice medicine or surgery.

(2) Divide the country into districts, varying in size according to the density of the population; the denser the population, the smaller in area; the size of the districts also to be governed by the means of communication.

(3) Assign to each district an internist, a surgeon, and an obstetrician. Group several districts into larger districts, to which assign an oculist, a rhinologist, a neurologist, etc.

(4) Assign to these districts physicians who might be entitled to exemptions for various reasons—dependency, hospital connections, advanced age, etc.

(5) All others to be put into military service.

(6) Patients to be required to consult the physician within their respective districts. Or to put it another way, no physician to be permitted to treat anyone outside of his district.

(7) A record to be kept of all fees collected. Of the fees a certain percentage to be retained by the physician. The remainder, from all physicians, to be put into a general fund and divided among the men in actual military service.

C. L.

### BOOK NOTICES.

**THE ACTION OF MUSCLES**, Including Muscle Rest, and Muscle Re-education. By **William Colin MacKenzie**, M. D., F. R. C. S., F. R. S. (Edin.), with 99 illustrations. Paul B. Hoeber, 67 and 69 East Fifty-ninth street, New York City, 1918. Price \$3.00.

The appearance in the last few years of extensive essays confined to one particular medical subject marks an advance in the progress of medical literature. Of this character is the present book.

This subject is of special interest at present, as the view is held that of the wounded men returning from the great war, 65 per cent are suffering from disabilities of an orthopedic nature, the injuries being of such a character that the muscular function becomes the



one of prime importance for purposes of treatment.

This function can only be taught on the living. It is largely a question of comparison between the normal and paralytic; and, especially in the latter case, the knowledge of the action of the opponent muscles is particularly necessary. True paralysis of the muscular tissue is very rare, a loss of a part of the function of a muscle is on the other hand, common. There is only one true test of muscular function, the volitional test scientifically applied.

In this book, 47 pages are given to the principles of muscular action; and the balance, up to 249 pages, to their practical application, with an extensive index of 18 pages in addition. Not only the diagnosis is well entered into, but the treatment with apparatus development and methods of reeducation, both of the injured muscles and of their assistants, are thoroughly discussed.

This book is of great value to the general surgeon. H. V. W.

**NEUROLOGICAL CLINICS.** Exercises in the **Diagnosis of Diseases of the Nervous System**, given at the Neurological Institute, New York, by the Staff of the First Division. Edited by Joseph Collins, M. D. New York. Paul B. Hoeber, 1918. Price \$3.00.

No longer is neurology practically limited, as it was at first, to the consideration of mental diseases and the paralyzes. But it is now so closely associated with not only general medicine, but also with the specialties of ophthalmology and otology, that it behooves not only the general practitioner, but the eye and ear man to make himself thoroughly familiar with anything that may occur within the cranium, as well as those lesions and symptoms which are associated with the organs of special sense and with the body.

This book is a collection of essays by a number of authors, being case histories selected from those presented by the First Division of the Neurological Institute at the biweekly conference,

care being taken to select those most likely to be encountered by the practitioner, but which he finds difficult to interpret and diagnosticate satisfactorily.

In the 41 essays it is particularly interesting to the ophthalmologist to note that in a very large proportion of them, the diagnosis has been markedly assisted by the ocular findings. Even in certain cases of brain tumor where there has not been a choked disc, the other findings, of the pupillary reactions, the visual fields, the ocular muscles, etc., have been of diagnostic value.

Of great interest is the essay on Myasthenia Gravis with photographs of patients showing their facial expression.

All the essays are well written and make very interesting reading.

H. V. W.

**INTERNATIONAL CLINICS**, Series 28, Vol. 2. Edited by R. H. M. Landis, M. D., Philadelphia. 286 pages. Illustrated. Philadelphia and London, J. B. Lippincott Company, 1918.

The sections of this volume of especial interest to the ophthalmologist are the Clinic by E. V. L. Brown, of Chicago, on "Focal Infection as a Cause of Keratitis and Iritis"; and "Primary Tuberculosis of the Conjunctiva," by Gaston E. Ayraud, surgeon to the Maritime Health Department, France.

Brown's lecture is based on three cases of keratitis, two interstitial, one phlyctenular, and two of iritis. In four of them improvement had followed removal of the tonsils. He also mentions another case in which unilateral interstitial keratitis occurred in a girl with a four plus Wassermann reaction. No improvement followed a month of inunctions and iodid. The tonsils were removed and in 2 or 3 days the eye had "improved marvelously," and was white and quiet in a week.

Ayraud reports a case in which giant cells and tubercle bacilli were found, a few of the latter in the conjunctival tissue and many in the cheesy pus from an enlarged gland, altho the inoculation of a guinea pig gave a negative result. The patient was a boy of 8 who seemed



generally healthy, and the disease was believed to be primary in the conjunctiva. It followed slight injury and the preauricular gland was the first to be enlarged. Recovery seemed complete. A section of the book which while not dealing with diseases of the eye will be of general interest to ophthalmologists is one on "The Early Diagnosis and Treatment of Syphilis of the Nervous System," by John E. Lind of Washington, D. C. E. J.

### CORRESPONDENCE.

#### RETINAL DETACHMENT TRAUMATIC?

*To the Editor:*

There has recently been under my care a case of retinal detachment occurring three weeks after an alleged traumatism. The detachment occurred in the upper half of the retina. Briefly the history is of three weeks of indefinite symptoms and then a sudden hemipopia in right eye. He came to me at this time. Vision was 10/200 in the right eye, 10/10 in the left. Ophthalmoscopic examination showed a simple detachment, which has extended to the lower half.

There is nothing peculiar in this case in itself other than the alleged cause.

I would like to have an expression of opinion thru the JOURNAL as to the probability of a jet of compressed air directed against an eye at a distance of five inches being productive of retinal detachment, in a case with no inflammatory symptoms such as conjunctivitis or cyclitis being produced.

I have been unable to find any reference in literature about the effects of compressed air trauma.

Hoping some useful information may be obtained, I am

Very truly yours,

WM. RAE YOUNG, M. D.

Wilksburg, Pa.

#### BIOGRAPHIC SKETCHES.

THOMAS HALL SHASTID, M. D.

SUPERIOR, WISCONSIN.

JOHN CHASE, Emeritus Professor of Ophthalmology in the University of

Colorado, died at his home in Denver, May 3rd. He was born at Ann Arbor, Michigan, December 10th, 1856, and graduated from the collegiate department of the University of Michigan in 1879.

In 1881 he graduated from the medical department of the same institution, and entered upon ophthalmic practice in association with Doctor Eugene Smith of Detroit. He spent some time studying in Paris and London, and settled in Denver in 1885.

He acquired a large practice and was active in the organization of the Gross Medical College, one of the medical schools afterwards merged in the Medical Department of the University of Colorado. He wrote little and his teaching was largely clinical.

For many years he was actively interested in military matters, having joined the National Guard of Michigan in 1878. In the Colorado National Guard he rose from private to the rank of Brigadier General, and served for seven years as Adjutant General of the state. His large frame, military bearing, and open, cordial manner, made him a commanding figure in any gathering, and won for him many friends.

FRIEDRICH CURT HARNISCH, a well known ophthalmologist of Chicago, died from heart disease in the Alexian Brothers Hospital, May 25, 1918. He was born Dec. 1, 1860, at Teuchern, Saxony, Germany, son of August and Beata Harnisch, and received his degree in medicine at the University of Leipsic in 1890. He practiced for a time at Leipsic, and the date of his removal to America has not been learned. He married in 1886 Anna Haferkorn. He was a man of medium height, thick set, of florid complexion, blue eyes, gray hair, and a grizzled Van Dyke beard. He was ophthalmic surgeon to the Alexian Brothers, St. Elizabeth's, and St. Mary of Nazareth's Hospitals.

HUGH TATE MOORE, Lieut., M. R. C., of Wilmington, N. C., died at Camp Kearney, San Diego, Calif., April 8, 1918, as a result of poisoning by mercuric chlorid taken by mistake for calomel. He was born at Bolivar, Tenn., in 1887, grew up at Bolivar, and studied

at Tulane University, New Orleans, where he received the M. D. in 1900. For about two years he practiced general medicine in New Orleans. In 1912 he removed to Wilmington, where he practiced as ophthalmologist and otolaryngologist until, in August, 1917, he entered the medical service of the army. He was a member of the First Presbyterian Church at Wilmington, and oculist and aurist to the James Walker Memorial Hospital. An acquaintance of the doctor writes, "He was a big-hearted, genial man, an excellent sportsman, genial and with a strong and robust physique. His death comes as a shock to his hundreds of friends."

GEORGE G. MURRAY, of Bellows Falls, Vt., died of pneumonia at his home on July 5, 1918. As a specialist on diseases of the eye, ear, nose and throat, he was well known locally. Born in Little Shemogue, New Brunswick, in 1876, he came to the United States to study medicine, and received his degree from the University of the South at Sewanee, Tenn., in 1901. For a time he engaged in general practice at Orville, Vt., but in 1908 removed to Rutland, and a year later to Bellows Falls, where he practiced until his death as ophthalmologist and otolaryngologist. Besides the widow and two sons, Dr. Murray left two brothers, D. T. Murray, of Dorchester, Mass., and Dr. Albert G. Murray, of Baxterville, Miss.

ADDISON JOHN PROVOST, ophthalmologist and otolaryngologist of Oshkosh, Wis., died at Hot Springs, Ark., July 7, 1918. He was born in Theresa, Dodge County, Jan. 14, 1863, removed with his father's family to Menasha, and later to Rudolph, in Wood County. For a time he worked as conductor on a railway, whereby he earned the means for a medical education. His medical degree was received at the Hahnemann Medical College, Chicago, 1891. For a time he practiced at Monroe, Wis., where, on Sept. 6, 1893, he married Miss Nell Sutherland. Of the union was born one child, a daughter. Shortly afterward the couple removed to Monticello, later still to Merrill, and,

finally, to Oshkosh, where the Doctor was a specialist in diseases of the eye, ear, nose and throat for many years. He enlisted in the medical department of the army, and, with the rank of captain, was stationed first at Ft. Riley, Kansas, later at Fort Bliss.

ARTHUR WASHINGTON DE ROALDES, famous blind otolaryngologist, and founder of the New Orleans Eye, Ear, Nose and Throat Hospital, died at his home in New Orleans, June 13, 1918. He was born in Opelousas, Louisiana, Jan. 25, 1849, son of Dr. Abel, and Coralie Testas de Folmont, de Roaldes, of an old south of France family. He was educated by the Jesuits in France, and later awarded the diploma of bachelier-ès-lettres in 1865. The following year he was made bachelier-ès-sciences. Returning to America, he received the medical degree at the University of Louisiana in 1869, and then went back to France for further medical study. His *ad eundem* was received at the University of Paris in 1870. He served with great distinction thruout the Franco-Prussian war, rescuing at one time seventeen wounded from a burning house in Bazailles during the heat of battle. In 1872 he returned to New Orleans, and soon was widely known as a general practitioner.

In 1887-89 Dr. de Roaldes made a special study of the eye, ear, nose and throat in the hospitals of Europe; and returning again to New Orleans, began to practice otology and laryngology. In 1889 he founded the New Orleans, Eye, Ear, Nose and Throat Hospital, also known as "The Senses Hospital," and was a trustee thereof and its surgeon-in-chief for many years. In 1890 he was made professor of diseases of the ear, nose and throat in the New Orleans Polyclinic.

We cannot mention here all the numerous honors which came to Dr. de Roaldes. He was made, however, a Knight of the Legion of Honor, and when he founded the Eye, Ear, Nose and Throat Hospital, the French government promoted him, and made him a grand commander in the Legion. He was also a Fellow of the American Col-

lege of Surgeons, a Member of the Institute of Social Sciences, and Chevalier of the Italian Order of St. Maurice and St. Lazare, and Commander of the Papal Order of St. Gregory the Great.

Dr. de Roaldes was a man of medium height and weight, of a dark com-

plexion, and brown eyes. He wore, as a rule, a Van Dyke beard. His manner was alert, prompt, and energetic. He was a Democrat, a member of the Roman Catholic Church. He was twice

married, first, in 1873, to Laura Pandely, who died in 1874, and in 1885 to Anna E. Miller, who survives him.

For the last twenty years of his life he was wholly blind, "but," as a friend declares, "despite this handicap he continued the practice of his profession as



Arthur William de Roaldes. 1849-1918.

plexion, and brown eyes. He wore, as a rule, a Van Dyke beard. His manner was alert, prompt, and energetic. He was a Democrat, a member of the Roman Catholic Church. He was twice

a specialist, working in surgery by the hands of others. A notable case of his almost uncanny skill, despite his blindness, occurred some years ago, in a mastoid case. The surgery to be em-



ployed was of the most delicate nature, and the surgeon assisting Dr. de Roides was operating with extreme caution. After the operation had proceeded to the point the operator thought could be followed with safety to the patient, the blind surgeon gently touched the affected part, and said to his coadjutor, 'I would go deeper here.' A further incision was made, and the necessity of the additional cut, which exposed diseased bone, was shown."

RICHARD WASH SALTER, a prominent ophthalmologist and otolaryngologist of New Orleans, died July 7, 1918. He was born in New Orleans, son of Thaddeus S., and Mary Drummond, Salter. His medical degree was received from the medical department of Tulane University, New Orleans, in 1892; whereupon the Doctor proceeded to the study of ophthalmology and otolaryngology in New York, London, and Vienna. Returning to New Orleans, he soon was widely known as a skillful operator, especially on the eye. From 1908-18 he was connected with the New Orleans Eye, Ear, Nose and Throat Hospital. His death is said to have occurred from a pistol wound in the head, self-inflicted with suicidal intent. He is survived by his widow, born Edna Bosse.

JOHN MILLER STEPHENS, of Pasadena, California, was killed in an automobile accident near Santa Maria, Calif., July 10, 1918. He was born in 1879 and received his medical degree at the Bellevue Hospital Medical College in 1903. The date of his entry into eye, ear, nose and throat work is not ascertainable. He had been unwell for a number of weeks at the time of his death, and had planned to take a vacation.

FRANK CHISHOLM TODD, Lieutenant Colonel N. A., American ophthalmologist of international reputation, died from lobar pneumonia at the Presbyterian Hospital, Chicago, July 4, 1918, having come to that city on a tour of inspection of camps. His body, returned to Minneapolis, was given a funeral with military honors. He was born at Minneapolis, Oct. 15, 1869, son

of Shubal D. and Lidana Ann Whicher Todd. He attended for a time the academic college of the University of Minnesota, but did not complete the course. He received, however, at the same university the degree in dentistry in 1891, and the Doctor of Medicine in 1892. Having studied ophthalmology and otolaryngology at New York, London, Paris, Berlin and Vienna, he returned to Minneapolis to practice. In 1899 he was made professor of diseases of the eye, ear, nose and throat at his alma mater. In 1902 he was made chief of the department, a position which he held until his death.

Dr. Todd was surgeon to the University of Minnesota, the Hill Crest Surgical, St. Barnabas, City, Northwestern, and Asbury Hospitals; and to the Chicago, Milwaukee and St. Paul Railway. He was a Fellow of the American Academy of Ophthalmology and Otolaryngology, of the American College of Surgeons, a Member of the Association of Military Surgeons. In 1902 he was President of the Hennepin County Medical Society, and, in 1914, was President of the Minnesota Academy of Medicine. He was an active member of the Section on Ophthalmology of the American Med. Association, and served as its Secretary 1902-03, and as its Chairman, 1913-14. He was the secretary and one of the organizers of The American Board for Ophthalmic Examinations.

Shortly after the United States entered the war, Dr. Todd enlisted in the Medical Reserve Corps, being commissioned as Major. Later he was transferred to the National Army, and advanced to a lieutenant colonelcy. He was first assigned to the base hospital at Camp Dodge, of which he was shortly made commanding officer. At the time of his death he was expecting to take his hospital unit for overseas service.

Lieut. Col. Todd was a man of medium height, spare of build, usually with a small moustache, blue eyes and sandy hair. He was deliberate, methodical, thoro. He was very fond of history, a Republican in politics, a member of no church, yet not a disbe-

liever. He married, Oct. 15, 1894, Mary Mabel Odell. Of the union were born four children, Margaret, John, Ann, Mary Mela. His place in ophthalmology, and in the hearts of all who knew him, cannot soon be filled.

adelphia, Feb. 21, 1918. He was born at Philadelphia, Nov. 10, 1847, the son of Dr. Laurence and Louisa Paleska (Smith) Turnbull. He received the A. B. at the Central High School, Philadelphia, in 1868, the A. M. in 1869,



Frank Chisholm Todd. 1869-1918.

CHARLES SMITH TURNBULL, ophthalmologist and otolaryngologist of international reputation, died of pneumonia at his home, 1935 Chestnut street, Phil-

adelphia, Feb. 21, 1918. He was born at Philadelphia, Nov. 10, 1847, the son of Dr. Laurence and Louisa Paleska (Smith) Turnbull. He received the A. B. at the Central High School, Philadelphia, in 1868, the A. M. in 1869,

ear, nose and throat at the University of Vienna.

Dr. Turnbull was surgeon to the U. S. Geological Survey in Wyoming and Montana in 1872, and of the Yellowstone Park in 1871-72; resident surgeon to the New York Ophthalmic and Aural Institute in 1873-75; chief of the aural department at the Jefferson Medical College for ten years; oculist and aurist to the German Hospital, Philadelphia, for more than thirty-five years, and for many years to other leading Philadelphia hospitals. He served in the Civil War in the 119th Pennsylvania Volunteers, and, since 1900, was

major-surgeon of the First Infantry, N. G., Pennsylvania.

Dr. Turnbull married Elizabeth Claxton, of Philadelphia, Oct. 18, 1877, and left three daughters, Mrs. Hamilton D. South, Mrs. M. R. Goldsborough, and Mrs. Nelson P. Vulte.

He was the author of numerous articles on ophthalmology and otology, and also translated from the German, Arlt's "Injuries of the Eye Considered Medico-Legally," Gruber's "Tenotomy of the Tensor Tympani Muscle," and Bruner's treatise "On the Methods of Connection of the Ossicles."

## NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. As these columns go to press on the 30th of the month contributors should send in their items by the 25th. The following gentlemen have consented to supply the News Item Editor with the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. H. Kress, Los Angeles; Dr. Geo. F. Keiper, Lafayette, Indiana; Dr. W. Holbrook Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Chas. P. Small, Chicago; Dr. Geo. M. Waldeck, Detroit; Dr. G. Oram Ring, Philadelphia. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered, as well as all foreign countries. Volunteers are therefore needed and it is hoped that they will respond promptly to this call.

### DEATHS.

Capt. Samuel Cobb Norris of Anderson, Indiana, aged 48, died at his home August 4th from disease of the liver.

### PERSONAL.

Dr. F. W. Edridge-Green has been appointed senior ophthalmic surgeon to the Central London Medical Boards for National Service Examinations.

Dr. William R. Murray has been appointed acting Director of the Department of Ophthalmology in the Medical School of the University of Minnesota.

Lieut.-Col. Casey Wood spent a few hours in Chicago recently, on his way back to Washington, from California. In addition to his other duties in the Surgeon General's office, Col. Wood is now in charge of a medical and surgical history of the war.

Dr. John G. Barnsdale, an ophthalmologist of Superior, Wisconsin, was convicted of violating the Harrison Narcotic Act and given a sentence of three years in the Federal Penitentiary at Fort Leavenworth and fined \$6,000. He was released on bond and will appeal his case on a writ of error, contesting the constitutionality of the Harrison Act.

### MILITARY NOTES.

Major Thomas A. Woodruff has been transferred to Camp Meade, Maryland.

Captain A. D. McConachie is now stationed at Base Hospital A, Orleans, France.

Dr. James G. Janney, of Lawton, Oklahoma, is abroad in the service with rank of captain.

The name of Capt. Harry N. Sweezy, of Lafayette, Indiana, is added to the Honor Roll.

Dr. H. A. Beaudoux, of St. Paul, Minn., has accepted a commission as captain in the M. R. C.

Dr. A. R. Irvine, of Salt Lake City, is now stationed at Camp Fremont, Palo Alto, California, with rank of captain.

Dr. Frank R. Spencer, of Boulder, Colorado, has accepted a commission in the Medical Reserve Corps, U. S. Army.

Capt. George E. Bellows, of Kansas City, has been assigned to the eye service at the base hospital at Ft. Riley, Kansas.

Dr. James A. Smith, who received a lieutenant's commission, M. R. C., in July, has been sent to Fort Oglethorpe.



Major A. C. Magruder, commanding officer of base hospital at Fort Sill, is on a short leave of absence visiting his family at Colorado Springs.

Dr. Charles P. Small has been promoted to the rank of captain. In addition to his duties as Head of the Chicago Physical Examining Unit of the Aviation Division, Capt. Small has been appointed Recruiting Officer and Medical Member of the Examining Board.

Lieutenant George Francis Patton, M. R. C., U. S. A., attached to the 165th regiment, the old 69th, has been decorated with the Croix de Guerre for bravery. During a heavy bombardment from the German batteries, in which gas shells were being used liberally, Lieut. Patton found that his gas mask hampered him in the dressing of wounds, so he removed the mask and went on working over the wounded until he was overcome. Dr. Patton was a graduate of the Baltimore Medical College in 1910, and at the time of entering the Reserve Corps was assistant attending surgeon to the Bronx Eye and Ear Infirmary.

#### MISCELLANEOUS.

The American Board of Ophthalmic Examinations will hold its fifth examination at the New York Eye and Ear Infirmary, New York, on Friday, October 25th, 1918.

Arthur S. Hamilton and Charles E. Nixon report in detail (Jour. A. M. A., June 29, 1918), the first case so far encountered of bi-

lateral optic atrophy, which has developed as the result of exposure to binitrotoluene in the manufacture of explosives.

The Index of Oto-Laryngology, formerly published in Chicago by Dr. J. C. Beck, which ceased publication at the beginning of the year, has resumed publication in The Annals of Otology, Rhinology, and Laryngology, beginning with No. 1, of Volume 27, 1918.

The degree of Doctor of Ophthalmology was granted in June by the University of Colorado to Dr. Wm. G. Harrison, Professor of Otology, Rhinology and Laryngology in the University of Alabama, and to Dr. Harvey J. Howard, Professor of Ophthalmology in the Peking Medical College, China.

Silex, a Berlin ophthalmologist, has trained 250 blinded soldiers to be self-supporting. Among the blinded men were two lawyers, four musicians, two teachers, six merchants, and one physician. Positions in factories are now held by 88; 36 are typists or correspondents; 33 are doing agricultural work, and 7 are telephone operators.

In a civil service examination for telephone operator, which will be held in the near future, a blind man living in Jacksonville, Ill., will take the test. If he passes successfully, special equipment will be installed for his use, and the commission will plan to have this equipment installed in all such positions, and used by our returned blinded soldiers.

# OPHTHALMIC LITERATURE

Under this head continuing the "Index of Ophthalmology" heretofore published in **Ophthalmic Literature** will be found the subjects of all published papers received during the last month, that bear to an important extent upon ophthalmology. The subject is indicated rather than the exact title given by the author. Where the original title has been in a foreign language it is translated into English. The journal in which the paper is published will indicate the language of the original.

The names of the different journals are indicated by abbreviations which generally correspond to those used by the **Index Medicus**, the **Journal of the American Medical Association**, and the **British Journal of Ophthalmology**. We will from time to time publish the list of ophthalmic journals, with the abbreviations used for each. Often a single letter discriminates between journals published in different languages. Thus "Arch. of Ophth." refers to the Archives of Ophthalmology, published in English; "Arch. d'Opht." indicates the French Archives d'Ophthalmologie; "Arch. de Oftal." refers to the Archivos de Oftalmologia Hispano-Americanos, while "Arch. di Ottal." indicates the Italian Archivio di Ottalmologia.

In this index of the literature the different subjects are grouped under appropriate heads; so that all papers bearing on the same, or closely related subjects, will be found in one group. The succession of the groups is the same from month to month, and identical with that of the Digest of the Literature. Where a paper clearly refers to two subjects that belong in different groups, it will be noticed in both groups.

Each reference begins with the name of the author in heavyface type. This is followed by the subject of his paper. Then in brackets a number with (ill.) indicates the number of illustrations, or a number with (pl.) the number of plates illustrating the article, (col. pl.) indicates colored plates. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that the paper was read before some society and gave rise to a discussion which is published with it.

The "repeated titles" may render accessible the essential part of a paper, the original of which could not be consulted. These give (in brackets) after the author's name the volume and page of this department of "Ophthalmic Literature" where the title of the paper will be found; and then the journal, volume, and page where the translation or abstract is published.

It is desired to notice every paper as soon as possible after it is published. Readers will confer a favor by sending titles they notice have been omitted, with journal and page of publication; and of their own papers, sending either a copy of the journal in which each appeared, or a reprint. These should be sent as soon as possible to 318 Majestic Building, Denver, Colorado.

## DIAGNOSIS.

**Dor.** Defects of Visual Acuity in the Army. Soc. d'Opht. de Paris, March, 1918. Abst. Arch. d'Opht., v. 36, p. 177.

**Hudson, A. C.** Reversible Screen Stereoscope. (6 ill.) Brit. Jour. Ophth., v. 2, p. 427.

**de Kleijn, A., and Stenvers, H. W.** Localization of Fracture of Optic Foramen with Radiography. (2 ill., 2 pl.) Graefe's Arch. f. Ophth., v. 91, p. 431.

**Lagrange, F.** Atlas of War Ophthalmoscopy. Amer. Jour. Ophth., v. 1, p. 613.

**Mayou, M. S.** Luminous Test Type. Amer. Jour. Ophth., v. 1, p. 574.

**Salzman, M.** Ophthalmoscopy of Anterior Chamber. Zeit. f. Augenh., v. 34, p. 160.

## THERAPEUTICS.

**Bichon.** Colloidal Sulphur in Rheumatic Ocular Disease. Clin. Opht., July, 1917. Amer. Jour. Ophth., v. 1, p. 607.

Action of Instilled Drugs on Eye. Abst. Jour. Amer. Med. Assn., v. 71, p. 414.

## OPERATIONS.

**Campos, E.** Anesthesia of Globe by Injec-

tion of Quinin Hydrochlorid. Brazil-Med., v. 32, p. 30.

**McKellar, J. H.** Iridectomy for Optical Purposes. Amer. Jour. Ophth., v. 1, p. 567.

## REFRACTION.

**Bardsley, P. C.** Bifocals for Myopes. Amer. Jour. Ophth., v. 1, p. 575.

**Lauber, H.** Changes of Distance between Pupils and Glasses with Varying Convergence. (5 ill.) Graefe's Arch. f. Ophth., v. 91, p. 82.

**Seidel, E.** Skiascopy in Determining Accommodation. (4 ill.) Graefe's Arch. f. Ophth., v. 91, p. 392.

**Wells, D. W.** To Fix Round Lenses. Amer. Jour. Ophth., v. 1, p. 616.

**Woodworth, C. W.** Astigmatism and Coma. Science, v. 47, p. 459.

**Zentmayer, W.** Apparent Accommodation in Aphakia. (Bibl.) Amer. Jour. Ophth., v. 1, p. 570.

## OCULAR MOVEMENTS.

**Aubineau, E., and Lenoble, E.** Nystagmus and Myoclonus. Arch. d'Opht., v. 36, p. 162.

- Cantonnet, A.** "Hole in Hand Test" of Binocular Vision. (2 ill.) Arch. d'Ophth., v. 36, p. 155.
- Heitger, J. D.** Diagnosis of Vertigo Based on Newer Ear Tests. Miss. Valley Med. Jour., June, 1918.
- Juarros.** Paralysis of the Right External Rectus with Cortical Lesions. Arch. de Oft. Hisp.-Amer., v. 18, p. 280.
- Landolt, E.** Tenotomy. Arch. de Oft. Hisp.-Amer., v. 18, p. 263.
- Marquez.** Strabismus. Abst. Jour. Amer. Med. Assn., v. 71, p. 413.
- Morrison, F. A.** Ophthalmoplegia. Amer. Jour. Ophth., v. 1, p. 571.
- Neal, H. V.** History of Eye Muscles. Jour. Morphology, March 20, 1918. Abst. Med. Jour., Australia, July 13, p. 35.
- Pischel, K.** Training of Fixation and Fusion in Strabismus. Calif. State Jour. Med., v. 16, p. 391.
- Vagliasindi.** Physiologic Binocular Diplopia. (17 ill.) Arch. di Ottal., v. 24, p. 355.
- Woodruff, H. W.** Surgical Treatment of Strabismus. (Dis.) Amer. Jour. Ophth., v. 1, p. 576.
- CONJUNCTIVA.**
- Castro, F. de.** Parinaud's Conjunctivitis, Tuberculosis of Conjunctiva. Abst. Amer. Jour. Ophth., v. 1, p. 608.
- Cohen, M., and Noguchi, H.** Epidemiology of Contagious Diseases of Eye. New York State Jour. Med., v. 18, p. 313.
- Connor, R., and Burkholder, C. A.** Pemphigus of the Conjunctiva. Amer. Jour. Ophth., v. 1, p. 545.
- Copeland, G. G.** Blindness of the Newborn; a Preventable Disease. Canadian Med. Assn. Jour., v. 8, p. 724.
- Finlay, C. E.** Trachoma. Abst. Jour. A. M. A., v. 71, p. 413.
- Morax, V.** Parinaud's Conjunctivitis. Abst. Amer. Jour. Ophth., v. 1, p. 607.
- Pereyra, G.** Frequency of Eosinophilia in Spontaneous and Provoked Conjunctivitis. Arch. di Ottal., v. 24, p. 341.
- Santos Fernandez, J.** Conjunctivitis of the Fornix. (Bibl.) Amer. Jour. Ophth., v. 1, p. 562.
- Tyrrell, F. A. C.** Mooren's Ulcer of Cornea. (Dis.) Amer. Jour. Ophth., v. 1, p. 573.
- Umeda, K.** Pemphigus of Conjunctiva. Zeit. f. Mil. Aerzte, 1918, No. 75, p. 9.
- Wherry, W. B., and Ray, V.** Cultures of Leptothrix from Cases of Parinaud's Conjunctivitis. Jour. Infectious Dis., v. 22, p. 554.
- CORNEA AND SCLERA.**
- Bane, W. C.** Serpent Ulcer of Cornea due to Pneumococcic Disease. Amer. Jour. Ophth., v. 1, p. 585.
- Kellogg, F. B.** Pasteurization in Corneal Ulcer. Jour. Amer. Inst. of Homeop., v. 11, p. 171.
- Kumagai, N.** Absorption of Cornea. Mitteil. a. d. med. Fakultät der kaiser. University, Tokyo, v. 18, No. 2. Abst. Jour. A. M. A., v. 71, p. 414.
- Martin, A.** Homologous Corneal Transplant. Amer. Jour. Ophth., v. 1, p. 565.
- Matson, W. F.** Interstitial Keratitis. Amer. Jour. Ophth., v. 1, p. 586.
- ANTERIOR CHAMBER AND PUPIL.**
- Roxburgh.** Cyst of Iris. Amer. Jour. Ophth., v. 1, p. 574.
- UVEAL TRACT.**
- Hepburn, M. L.** Choroidal Scar. Amer. Jour. Ophth., v. 1, p. 574.
- v. Hippel, E.** Tuberculosis, Sympathetic and Proliferating Uveitis of Unknown Etiology. Arch. f. Ophth., v. 92, 1917. Abst. Brit. Jour. Ophth., v. 2, p. 442.
- Mazzei, A.** Experiments on Action of Iris in Dogs. Arch. di Ottal., v. 24, p. 386.
- SYMPATHETIC DISEASE.**
- Poulard, A.** Sympathetic Ophthalmia. Ann. d'Ocul., v. 155, p. 297.
- Repeated Titles. Morax. (v. 1, p. 220.) Brit. Jour. Ophth., v. 2, p. 444. Poulard (v. 1, p. 220) Brit. Jour. Ophth., v. 2, p. 442, 443.
- GLAUCOMA.**
- Bailliant, P.** Variations in Arterial Intraocular Tension. (6 ill.) Ann. d'Ocul., v. 155, p. 267.
- Magitot.** Physiologic Ocular Tension. Amer. Jour. Ophth., v. 1, p. 587.
- Zimmermann, C.** Pathology of Glaucoma. Wisconsin Med. Jour., v. 17, p. 98.
- Repeated Titles. Marbaix (v. 1, p. 542), Amer. Jour. Med. Sc., v. 156, p. 300.
- CRYSTALLINE LENS.**
- Allport, F., and Smith, J.** Bilateral Luxation of Lens. Amer. Jour. Ophth., v. 1, p. 573.
- Araña, F.** Electric Cataracts. Arch. de Oft. Hisp.-Amer., v. 18, p. 278.
- Castresana, B.** Vacuum Extraction of Cataract. Abst. Jour. A. M. A., v. 71, p. 694.
- Gonzales, J. de J.** Spontaneous Absorption of Cataract. An. de la Soc. Oftal., Mexico, v. 1, p. 66.
- Jackson, E.** Partial Cataract Following Injury. Amer. Jour. Ophth., v. 1, p. 585.
- Luna Pacheco.** Suture of Cornea in Cataract Operations. Arch. de Oftal. Hisp.-Amer., v. 18, p. 270.
- Schanz, F.** Origin of Diabetic Cataract. Graefes Arch. f. Ophth., v. 91, p. 238.
- RETINA.**
- Brav, A.** Ocular Complications in Renal Disease. Arch. of Diag., v. 11, p. 29.
- Curtin, T. H.** Surgical Treatment of Retinal Detachment. Amer. Jour. Surg., v. 32, p. 177.



- Gruenbaum, A. A.** Psychophysics of Optical Fatigue. *Abst. Amer. Jour. Ophth.*, v. 1, p. 606.
- Heed, C. R.** Angioid Streaks in Retina. *Amer. Jour. Ophth.*, v. 1, p. 583.
- Krauss, F.** Occlusion of Central Artery of Retina. *Amer. Jour. Ophth.*, v. 1, p. 583.
- Magitot, A.** Night Blindness. *Abst. Amer. Jour. Ophth.*, v. 1, p. 369.
- Strickler, D. A.** Retinal Angiosclerosis. *Amer. Jour. Ophth.*, v. 1, p. 584.

#### TOXIC AMBLYOPIAS.

- Elliot, R. H.** Quinin Poisoning; Its Ocular Lesions and Visual Disturbances. *Amer. Jour. Ophth.*, v. 1, pp. 547, 650.
- Hamilton, S., and Nixon, C.** Optic Atrophy and Multiple Neuritis from Manufacture of Explosives. *New York Med. Jour.*, v. 108, p. 218.
- Jacobowsky, B.** Influence of Santonin on Vision. *Upsala Läk. Forhandl.*, v. 22, p. 471.

#### OPTIC NERVE.

- Goldsmith, G. H.** Cyst in Front of Disc. *Abst. Amer. Jour. Ophth.*, v. 1, p. 573.
- Harwood, C. B.** Hole in Disc. (1 ill.) *Amer. Jour. Ophth.*, v. 1, p. 572.
- Hughes, L. J.** Unilateral Papilledema. *Amer. Jour. Ophth.*, v. 1, p. 579.
- Morrison, F. A.** Optic Neuritis. *Amer. Jour. Ophth.*, v. 1, p. 572.
- Paton, L.** Neuroretinitis with Chickenpox. *Abst. Amer. Jour. Ophth.*, v. 1, p. 575.
- Posey, W. C.** Optic Nerve Lesions Following German Measles. *Amer. Jour. Ophth.*, v. 1, p. 582.
- Tilmev, F.** Supraoptic Canal in its Relation to Interpretation of Choked Disc. *Neurologic. Bull.*, v. 1, p. 265.
- Viner, G.** Hyaline Bodies on Disc. (1 col. pl.) *Brit. Jour. Ophth.*, v. 2, p. 426.

#### VISUAL TRACTS AND CENTERS.

- Culbertson, L. R.** Cause of Defective Orientation. *Ann. Otol. Rhin. and Laryngol.*, v. 27, p. 187.
- Dawson, S.** Theory of Binocular Color Mixture. *Brit. Jour. Psychol.*, v. 9, p. 22.
- Pusey, B.** Case of Quadrantic Blindness. *Jour. Nerv. and Ment. Dis.*, v. 47, p. 217.
- Stevens, G. T.** Righthandedness in Relation to Visual Conditions. *N. Y. Med. Jour.*, Aug. 17, p. 269.
- Yealland, L. R.** Hysterical Disorders of Vision. *Abst. Amer. Jour. Ophth.*, v. 1, p. 575.
- Young, G.** Threshold Tests. (3 ill.) *Brit. Jour. Ophth.*, v. 2, p. 430.

#### COLOR VISION.

- Color Blindness Among U. S. Seamen. *U. S. Public Health Bull. No. 92.*
- Jackson, E.** Tests for Color Blindness. *Amer. Jour. Ophth.*, v. 1, p. 586.

- Luckiesh, M.** Retiring and Advancing Colors. *Amer. Jour. Psychol.*, v. 29, p. 182.
- Tests for Color Blindness. *N. Y. Med. Jour.*, Aug. 17, p. 295.

#### EYEBALL.

- Coriat and Boulai.** Bilateral Metastatic Ophthalmia After War Injury. *Arch. d'Opht.*, v. 36, p. 168.
- McCassy, J. H.** Evisceration. *Ohio State Med. Jour.*, v. 14, p. 476.
- Torres Estrada, A.** Problem of Enucleation. *An. de la Soc. Oftal., Mexico*, v. 1, p. 72.

#### THE LACRIMAL APPARATUS.

- Rochat, G., and Benjamins, C. E.** Anatomy of Lacrimal Canal in Rabbit. (15 ill.) *Graefe's Arch. f. Ophth.*, v. 91, p. 66.

#### LIDS.

- Pusey, B.** Tuberculosis of the Mucous Surface of Upper Lid Cured by Radium. *Jour. Cutaneous Dis.*, v. 34, p. 242.
- Slocum, G.** Cicatricial Ectropion Corrected by Plastic Operation. *Jour. Mich. Med. Soc.*, v. 17, p. 189.

#### ORBIT.

- Barker, L. F.** Nervous and Mental Symptoms of Exophthalmic Goiter. *Jour. Amer. Med. Assn.*, v. 71, p. 327.
- Fromaget, H.** Surgery of Orbit in Military Service. *Arch. d'Opht.*, v. 36, p. 146.

#### PARASITES.

- Ocular Lesions from Filaria and Allied Parasites. *Amer. Jour. Ophth.*, v. 1, p. 609.
- Perez Bufill.** Kerato-conjunctival Myiasis from Rhinostomus Nasalis. *Arch. de Oftal. Hisp.-Amer.*, v. 18, p. 273.
- Ward, H. B.** Animal Parasites of Human Eye. *Amer. Jour. Ophth.*, v. 1, p. 614.

#### TUMORS.

- Campbell, C. A.** Neurofibromatosis of Orbit. *Amer. Jour. Ophth.*, v. 1, p. 560.
- Müller.** Bilateral Symmetrical Lipodermoid of Inner Canthus. (2 ill.) *Zeit. f. Augenh.*, v. 34, p. 157.
- Pfingst, A. O.** Mixed Tumor of Lacrimal Gland. *Southern Med. Jour.*, v. 11, p. 587.
- Posey, W. C.** Tumor of Orbit. *Amer. Jour. Ophth.*, v. 1, p. 582.

#### INJURIES.

- Cerise.** Oculo-palpebral Burns in War. *Soc. d'Opht. de Paris. March, 1918.* *Arch. d'Opht.*, v. 36, p. 174.
- Cords, R.** Prognosis and Therapy of Fronto-occipito-orbital Wounds. (8 ill.) *Zeit. f. Augenh.*, v. 34, p. 133.
- Duverger.** Symptoms in Wounds of Posterior Segment of Eye. *Arch. d'Opht.*, v. 36, p. 133.
- Lagrange, F.** Fractures of Orbit, and Injuries to Eye in War. (77 ill., 6 pl.) London: University Press.

**Lister, W. T.** Pathologic Aspects of Certain War Injuries of Eye. *Lancet*, July 20, p. 67.

**Terrien, F., and Cousin, G.** Injury to Eye-ball from Splinters in War. (2 ill.) *Arch. d'Opht.*, v. 36, p. 129.

**Vacher.** War Wounds of Orbit and Sinuses. *Soc. d'Opht. de Paris*, March, 1918. *Arch. d'Opht.*, v. 36, p. 174.

**Valude, E.** Radioscopy and Radiography of Foreign Bodies in Eye. *Ann. d'Ocul.*, v. 155, p. 261.

#### PATHOLOGY.

**v. Szily, A.** Anaphylaxis in Ocular Disease. *Graefe's Arch. f. Ophth.*, v. 91, p. 227.

#### GENERAL DISEASES.

**Brooks, E. H.** Eye in Relation to Constitutional Diseases. *Wisconsin Med. Jour.*, v. 17, p. 103.

**De Boe, M. P.** Eye from Standpoint of General Practitioner. *Jour. Florida Med. Assn.*, v. 4, p. 357.

**Gordon, A.** Diminutive Visual Hallucinations. *Jour. Nerv. and Ment. Dis.*, v. 47, p. 434.

**Gowens, H. L.** Eye Symptoms of Infantile Paralysis. *Jour. Amer. Inst. Homeop.*, v. 11, p. 174.

**Marquez.** Ocular Leprosy. *Arch. de Oft. Hisp.-Amer.*, v. 18, p. 266.

**Maxwell, E. M.** Eye Conditions Met with in Malta. *Brit. Jour. Ophth.*, v. 2, p. 406.

**Moret.** Eye Symptoms with Spirochete Jaundice. *Arch. Méd. Belges*, v. 70, p. 1105. *Abst. J. A. M. A.*, v. 71, p. 691.

**Ring, G. O.** Ocular and Nasal Accessory Sinus Disease. *Ann. Otol. Rhin. and Laryngol.*, v. 27, p. 251.

**Stephenson, S.** Acute Anterior Ethmoiditis in Young Subjects. *Brit. Jour. Ophth.*, v. 2, p. 416.

**Wechsler, I. S.** Ophthalmic Changes in Tabes and Paresis. (Bibl.) *N. Y. State Jour. Med.*, v. 18, p. 304. *N. Y. Med. Jour.*, v. 108, p. 181.

#### COMPARATIVE OPHTHALMOLOGY.

**Rochat, G. F., and Benjamins, C. E.** Anatomy of Lacrimal Canal in Rabbit. (15 ill.) *Graefe's Arch. f. Ophth.*, v. 91, p. 66.

#### HYGIENE.

**French, W. J.** Prevention of Blindness, Work of the Industrial Accident Commission. *Calif. State Jour. Med.*, v. 16, p. 377.

**Ferro, P. B.** Hygiene of the Eyes. *Semana Med.*, v. 24, p. 706.

**Higgins, C.** Triplex Glass. (2 ill.) *Lancet*, July 20, 1918, p. 95.

**Marquez, D. M.** Hygiene of Vision. *Med. Ibero*, v. 2, p. 65.

#### PROFESSIONAL RELATIONS — EDUCATION—HISTORY.

A Ministry of Health. *Brit. Jour. Ophth.*, v. 2, p. 433.

Education of Blinded Soldiers. *Brit. Med. Jour.*, June 29, 1918, p. 730.

**Ferguson, J.** Optometry in Ontario. *Canada Lancet*, May. *Brit. Jour. Ophth.*, v. 2, p. 435.

Loss of Lens Not Loss of Eye. (Medico-legal). *Jour. Amer. Med. Assn.*, v. 71, p. 490.

Ophthalmic Examinations. *Amer. Jour. Ophth.*, v. 1, p. 616.

School for Optical Munitions Workers. *Science*, v. 48, p. 109.

**Silex.** Blinded Soldiers. *Abst. Jour. Amer. Med. Assn.*, v. 71, p. 482.

**Smith, J. J.** Eye, Ear, Nose and Throat Work at Recruiting Station. *New York Med. Jour.*, v. 108, p. 69.

**Sym, W. G.** James Wardrop. (1 ill.) *Brit. Jour. Ophth.*, v. 2, p. 401.

Thermometer for the Blind. *Lancet*, July 20, p. 96.

**Vogt.** Accident Insurance and Ophthalmology. *Abst. Jour. Amer. Med. Assn.*, v. 71, p. 691.

Repeated Titles. **Ginestous.** (v. 1, p. 302.) *Jour. Amer. Med. Assn.*, v. 71, p. 606.





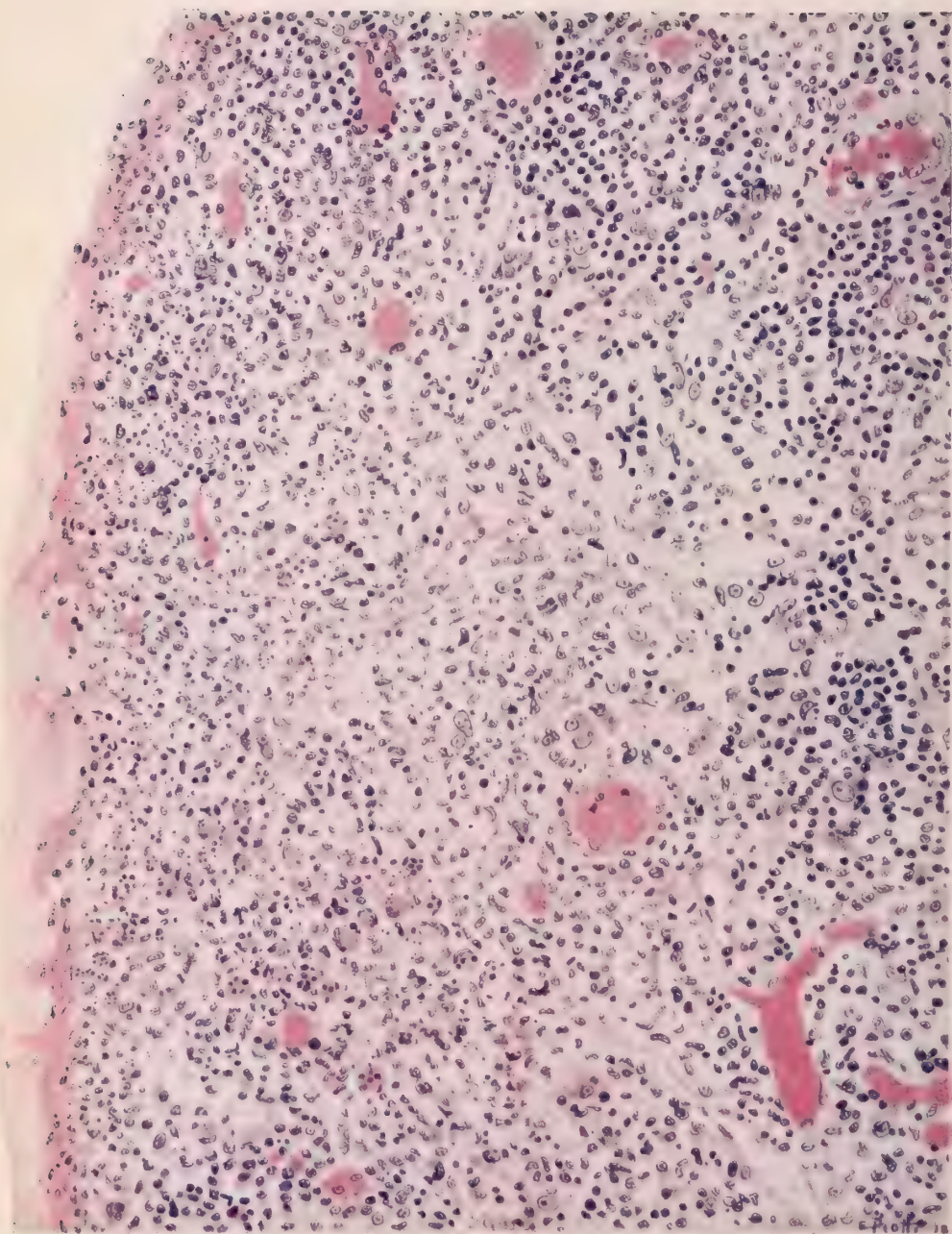


FIG. 1. CHARACTERISTIC LESION OF PARINAUD'S CONJUNCTIVITIS (LEPTOTHRICOSIS CONJUNCTIVAE) VERHOEFF. CENTRAL AREA OF CELL NECROSIS CONTAINS CHIEFLY ENDOTHELIAL PHAGOCYTES LOADED WITH CHROMATIN FRAGMENTS. MANY SHOW NUCLEAR PYCNOSIS, FRAGMENTATION AND OTHER EVIDENCES OF NECROSIS. GRANULATION TISSUE INVADING FROM RIGHT, AND AREA SURROUNDED BY CHRONIC INFLAMMATORY CELLS.

# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 1

OCTOBER, 1918

No. 10

## OBSERVATIONS ON PARINAUD'S CONJUNCTIVITIS.

(Leptothricosis Conjunctivae.)

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An account of this disease based upon a study of eighteen cases verified by full microscopic examination; demonstrating the histologic characteristics of the lesion and the presence of the leptothrix. With colored plate and illustration in the text.

Five years ago I reported the finding of minute leptothrices in eleven cases of Parinaud's conjunctivitis and presented reasons for regarding these organisms as the cause of the disease<sup>1</sup>. Since other observers have failed to find these organisms, and many have continued to confuse the disease with tuberculosis of the conjunctiva, it seems worth while to record my further observations and to review my entire experience with the disease, which now covers a period of fourteen years.

Since my previous communication on the subject, I have seen and examined six additional cases of Parinaud's conjunctivitis in each of which the characteristic leptothrices were found in large numbers. In all, I have studied eighteen cases, a far greater number than has hitherto been reported by any other single observer, including Parinaud himself, who reported only four cases. This unusual experience has been due largely to the fact that colleagues, especially Drs. F. M. Spalding, F. E. Cheney, and P. S. Smyth, have referred their cases to me. All but one of the eighteen cases were seen by me clinically, and all of them were examined by me microscopically. In almost all of the cases I personally excised the tissues for examination. These cases were without question all authentic, whereas many of the cases in the literature are, to say the least, doubtful, so that the follow-

ing analysis of the more important features of my cases probably gives a more accurate conception of the disease than would a similar analysis of the far larger series of cases that could be collected from the literature.

### ANALYSIS OF EIGHTEEN CONSECUTIVE CASES OF PARINAUD'S CONJUNCTIVITIS.

(1) NATIONALITY.—All the patients were natives of the United States. Twelve patients had English names. In two cases the parents were born in Italy. There were no Hebrews.

(2) LOCALITY.—The patients lived in various towns within thirty miles of Boston.

(3) OCCUPATIONS.—The occupations of the patients or of their fathers were as follows: Laborer, 3; carpenter, 2; boilermaker, 1; machinist, 2; grocer, 1; stenographer, 2; factory hand, 1; electrician, 1; painter, 1; not recorded, 4.

(4) SEASON.—January, 6 cases; February, 1; May, 1; July, 1; September, 1; October, 1; November, 3; December, 4. The disease therefore occurred at all seasons, but was far more frequent in winter than in summer.

(5) TRAUMA.—Four cases gave definite histories of trauma within a week of the onset of eye symptoms. One patient was scratched in the eye by a grape vine, another by a cat, and another by his brother's finger. The other patient got twelve steel filings



into his eye which were picked out by means of a match.

(6) **ANIMAL CONTACT.**—One patient took care of a horse, another a pig, one child played with a guinea pig. In no case was there contact with an animal known to be diseased.

(7) **AGE.**—The youngest three patients were aged 3, 6, and 7 years; the oldest 35. The average age was 18 years.

(8) **SEX.**—Males, 14; females, 4.

(9) **EYE AFFECTED.**—Right eye, 9; left eye, 9; both eyes, 0.

(10) **CONSTITUTIONAL SYMPTOMS.**—These were insignificant in all cases. The highest temperature noted was  $100\frac{2}{5}^{\circ}$ ; but the temperature was taken in only a few cases and then not repeatedly.

(11) **GLANDULAR INVOLVEMENT.**—In addition to the preauricular, which was enlarged and tender in all cases, enlargement of the submaxillary glands was noted in 7 cases, and of the cervical glands in 3 cases. In no case did a gland break down, altho in several cases the swelling was very great. In one case the patient applied to a general hospital for treatment of the glandular involvement, before he was aware of the eye condition, but in the other cases the glandular involvement and the eye symptoms were noted at about the same time. In no case have I had opportunity to examine an affected gland histologically, but no doubt it would show the same lesions as the conjunctiva.

(12) **SITUATION OF EYE LESIONS.**—Above, 8 cases; below, 7; above and below, 2; bulbar conjunctiva, 3; palpebral conjunctiva, 4; fornix, 8; not accurately recorded, 3.

(13) **CHARACTER OF THE EYE LESIONS.**—Polypoid projections of the conjunctiva of the fornix or lids were recorded in 7 cases. One was recorded as measuring 7 mm. in length and 2.5 mm. in thickness. They were usually single, but there were four small ones in one case. All of the cases showed from one to eight or more greyish or yellowish areas in the affected portions of the conjunctiva. The smallest of these were about  $\frac{1}{2}$  mm. in size, the

largest three to four mm. The larger were not circular in shape, but generally roughly quadrilateral. In some cases it appeared as if the larger areas were conglomerations of smaller spots. They could be stained with fluorescein. In one case, in which the lower lid was chiefly affected, the upper lid showed one small grey area exactly on the lid margin. In three cases it was recorded that the fornix was thickened to such an extent as to overhang the cornea. In many of the cases there was marked enlargement of the ordinary conjunctival lymph follicles. Ulcers were not observed in any of the cases. The secretion from the eye was never abundant. The cornea was unaffected in all cases.

(14) **DURATION.**—The duration of the eye symptoms before operation was from four days to five weeks; after operation, from five days to one month. The glands subsided more slowly, usually remaining somewhat enlarged for one to three months.

(15) **HISTOLOGY.**—Every case in the entire series showed the histologic picture which I have shown to be characteristic of this conjunctival disease alone. The essential lesion is a focal area, .3 mm. in diameter or larger, densely packed with endothelial phagocytes loaded with broken down chromatin granules, which is situated just beneath the epithelium. These areas I have referred to as areas of cell necrosis. This term may have given rise to misconception, since it may have been understood to refer to areas of necrosis similar to those of tuberculosis, altho I have taken pains to explain to the contrary. Perhaps it would be better to term the lesions areas of endothelial phagocytosis. The explanation of these areas became obvious when I finally found within them leptothrices in large numbers. The endothelial phagocytes are evidently attracted by the leptothrices, since they invade the masses of the latter and since they frequently contain many of the organisms, a fact that I have previously neglected to mention. Many of the phagocytes show various stages of necrosis, due, evidently, to the toxic action of the or-



ganisms, the resulting cell detritus being taken up by the newly arrived phagocytes. This process is so extensive that it is difficult to find in the lesions an endothelial leucocyte which is free from chromatin fragments. The endothelial phagocytes seem to be derived chiefly from the endothelium of the conjunctival lymph spaces, for the cells of the latter can be seen in all stages of active proliferation while the spaces themselves are distended with the phagocytes. The endothelial cells never form Langan's great cells in the areas of necrosis. In hundreds of sections of Parinaud's conjunctivitis examined, I have found only three Langan's great cells, and each of these occurred away from the areas of cell necrosis. [See Plate XIV, Fig. 1.]

The tissue in all my cases was excised within a few weeks after the onset of the disease; and since recovery promptly followed, I have had no opportunity to study histologically cases that have persisted several months. The chief variations, I found, were in the sizes of the areas of the cell necrosis, and in the amount of granulation tissue that was formed as the result of the reaction around them. In the older cases there was a considerable number of pus cells in addition to the endothelial phagocytes in the lesions. Surrounding the areas, the tissue in all the cases was densely infiltrated with chronic inflammatory cells among which plasma cells largely predominated.

(16) BACTERIOLOGY. — Leptothrices in large numbers, were found in all cases except the one noted in my previous paper, in which there was insufficient material saved, and in no case were any other organisms found in the lesions. As regards the morphology of the organisms, I have nothing to add to my previous description, from which, for the sake of completeness, I quote as follows:

"In all cases the microorganisms occur in irregular masses measuring from 10 to 60 micra in diameters, but isolated individuals are also seen. At first the masses may appear to consist of minute dots, but careful examina-

tion with an oil immersion lens shows that they are composed of filaments. The latter seem to have no definite arrangement but are simply intertwined about each other. The individual filament is extremely delicate, stains

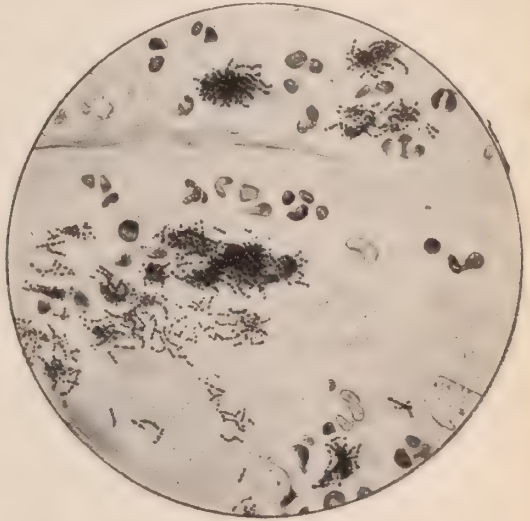


Fig. 2.—Showing masses of leptothrices and individual filaments in a large area of cell necrosis. Modified Gram stain. Zeiss comp. oc. 6, obj. 1-12.

faintly, and has single contour. It may be apparently straight or more often irregularly curved. Sometimes it is more than once bent almost at right angles. At almost regular intervals along the filament round dots occur which stain intensely by the modified Gram method. These dots are never exactly centered in the axis of the filament but project noticeably above its surface. The dots are seldom all of the same size on one filament, the largest having a diameter a little greater than that of the filament itself. Usually they are close together, at intervals of about three or four of their diameters, but occasionally they are far apart. In thickness the filaments are usually about  $.33\mu$ , that is, about the thickness of the influenza bacillus, but individuals half this size are occasionally seen, especially in tissue scrapings. In sections the filaments seldom appear very long, usually 3 to 10 micra, due no doubt to their quickly passing out

of the plane of the section. Some of the long filaments appear either to become thinner or to stain less intensely towards their ends." [See Fig. 2.]

"Except in one case the microorganisms are found only in or within the close vicinity of well marked areas of cell necrosis. In this case, which was evidently an early one, numerous masses can in addition be seen in the superficial lymph spaces, and are especially prominent just beneath the epithelium, where, as I have pointed out, the areas of cell necrosis usually occur. Such masses are undoubtedly the starting points for these areas, for all the stages in the formation of the latter can be made out, beginning with the invasion of a mass of microorganisms by a few endothelial cells. Thus this case is alone sufficient to exclude the possibility of the microorganisms being secondary invaders. The predilection of the microorganisms for the lymph spaces explains the early involvement of the regional lymph glands in this disease."

**METHOD OF EXAMINING THE LESIONS.**  
—The best method of demonstrating the microorganisms is by means of sections, but a special staining method is absolutely essential. In two cases in which I endeavored to demonstrate them in spreads made from the areas of phagocytosis I was successful, but the difficulty in staining the organisms was so great that I do not at present recommend this as a routine procedure.

In excising the tissue for examination, care should be taken to include one of the grey areas, for it is only in these that the organisms can be found. To insure good histologic specimens, care should also be taken not to grasp or in any way crush the portion of the tissue containing the area. The best fixative is Zenker's fluid, both for demonstrating the organisms and the histology of the lesions, altho in case of necessity it is possible to stain the organisms after other fixatives. Before placing the specimen in the fixing fluid, it should be placed upon and allowed to adhere to a small bit of paper in such position that later it can be

oriented and sections cut vertical to the epithelial surface. For staining the organisms, I described in my previous paper a modified Gram stain, which was applicable only to paraffin sections. Since then, I have still further modified the method so that it may be used also for celloidin sections. While the results of the newer method are perhaps not superior to the best of those given by my original method, they seem to be more uniform. With this modification the preliminary treatment of the section with balsam is not absolutely necessary, but gives more brilliant results than when it is omitted. I have found this method superior to the Gram-Weigert method for demonstrating any sort of Gram positive organisms in sections.

1. Sections  $6\mu$  to  $10\mu$  thick. Stain lightly in hematoxylin and eosin, mount in Canada balsam, and examine under microscope. Select only sections which show areas of endothelial phagocytosis. After five minutes or longer (10 years is not too long) remove cover slip by aid of heat and wash off excess of balsam with xylol. Chloroform, 95 per cent. alcohol, water.

2. If celloidin section, place on slide, wipe off excess of water.

3. Stirling's gentian violet, 12 minutes.

4. Water. Remove from slide, if celloidin section.

5. Lugol's solution (1:2:100), 20 seconds.

6. Water.

7. Ninety-five per cent alcohol, in small dish, 20 seconds.

8. Chloroform, in small dish, 15 seconds.

9. Oil of origanum, in dish, 15 seconds.

10. Ninety-five per cent alcohol, 30 seconds. This removes the excess of stain from the celloidin.

11. Oil of origanum. Place on slide and blot.

12. Wash off thoroly with xylol and blot.

13. Xylol-balsam.

In the case of paraffin sections the same procedure is followed, except that



the solutions are dropped upon the slide.

The greatest care is required in the differentiation in alcohol and chloroform. A variation of a few seconds here makes a great difference in the results. It is therefore well to carry a number of sections at one time up to step (6) and then differentiate each separately, varying the time a few seconds from that stated. If the differentiation is perfect, the leptothrix filaments as well as the dots on them will be stained, otherwise the dots alone may be stained so that the organisms will appear as rows of dots. If the differentiation is carried too far, especially in the alcohol (7) the organisms may be completely decolorized.

**INOCULATIONS AND CULTURES.**—Animal inoculations were made in six cases, with negative results in all instances. A guinea pig was inoculated subcutaneously in the groin in one case, and another in the anterior chamber. A rabbit was inoculated in the anterior chamber in one case, and beneath the conjunctiva in two cases. Pieces of tissue were introduced beneath the conjunctiva of monkeys (*macacus rhesus*) in two cases, and beneath the conjunctiva of a kitten in one case. A white mouse was inoculated in the abdominal wall in one case. An anthropoid ape, unfortunately, was never available.

Cultures were attempted in five cases. Coagulated blood serum, hydrocele agar, blood agar, glycerin agar, glucose agar, potato, under both aerobic and anaerobic conditions, were all used, but with negative results except for contamination with the usual bacteria. Owing to the organisms being so near the surface of the tissue it is of course difficult to avoid contaminations with the surface flora. Another difficulty in making cultural examinations, is that the cases are so infrequent that it is not possible to have special culture media ready when they occur. For this reason I have not had opportunity to employ the media used by Noguchi for cultivating the *spirocheta pallida*.

From the foregoing it will be seen that in Parinaud's conjunctivitis we have a disease that presents focal lesions differing in character from those of any other conditions of the conjunctiva, that within these foci and nowhere else, there invariably occur minute leptothrices, differing from any other known organisms, that no organisms of any other kind can be demonstrated in these foci, that the lesions are covered with epithelium which protects them from contamination with surface microorganisms, that endothelial phagocytes are attracted by the leptothrices, taken up by them, and are thereby destroyed, thus explaining the character of the lesion, and, finally, that all these conditions occur in every case. From these facts the conclusion is inevitable that the leptothrices are the cause of the disease. It would, of course, be desirable, if possible, to cultivate the organisms, and to reproduce the disease in animals, but this additional evidence is certainly unnecessary here, and while artificial cultivation of the organisms will no doubt finally be accomplished, it is doubtful if reproduction of the disease in animals other than man will ever be successful. [Since this was written, Wherry and Ray<sup>2</sup> have reported the cultivation of a leptothrix from the preauricular gland in a case of Parinaud's conjunctivitis. They employed Dorset's egg medium incubated under partial tension and anaerobic conditions. They state: "It seems probable tho not certain that the organism grown by us is identical with that found in sections by Verhoeff."]

**CONFUSION WITH TUBERCULOSIS.**—Owing to the frequency with which cases of conjunctival tuberculosis have been described as cases of Parinaud's conjunctivitis, some observers have maintained that the latter is not in fact an entity. The above observations, however, prove conclusively that there is a disease of the conjunctiva, due to infection with a specific microorganism, and presenting histologically characteristic lesions, that possesses the clinical features described by Parinaud. Since these clinical features are in



themselves so characteristic as to exclude, except possibly in isolated instances, all other diseases of the conjunctiva, there should be no doubt that the disease investigated by me is identical with that described by Parinaud. Parinaud, however, knew nothing of its histology or etiology, so that to this extent his identification of the disease was incomplete. For this reason it would be preferable now to employ the designation *Leptothricosis Conjunctivae*.

Altho it has now been fourteen years since I described the characteristic histologic picture of Parinaud's conjunctivitis, and many observers have subsequently made microscopic examinations of the tissues in the disease, yet only one observer, Bernheimer,<sup>3</sup> has given a sufficiently accurate description to show that he has recognized the essential lesions. The descriptions of other observers seem to indicate that they have given their attention to the diffuse infiltration around the essential lesions, which presents no especially characteristic features. In some instances no doubt the lesions have simply been overlooked, in others insufficient sections have been made, or care has not been taken to see that the tissue removed contained one of the greyish areas referred to above. In this connection, it may be well to point out, that enlarged lymph follicles which are often present in this disease, should not be mistaken for the essential lesions. Since most of the observers have thus failed to find the essential lesion of the disease, it is not surprising that they also failed to find the infecting organisms which occur only in these lesions.

The evidence of those observers who maintain that Parinaud's conjunctivitis is a form of tuberculosis seems to be about as follows in all cases: A patient presents himself with one or more granulations springing from the conjunctiva and an enlarged preauricular gland. The condition being a novelty to the observer, he makes a diagnosis of Parinaud's conjunctivitis. He then removes some of the tissue and inoculates with it a guinea pig or rabbit. The animal develops tubercu-

losis, hence Parinaud's conjunctivitis is a form of tuberculosis! As a matter of fact all that he has proved is that his original diagnosis was erroneous. If he had made a microscopic examination of the tissue he would have found the typical histologic picture of tuberculosis, which as I have conclusively shown does not bear the slightest resemblance to that of Parinaud's conjunctivitis. These observers seem to ignore the fact that guinea pigs have frequently been inoculated with tissue from cases of Parinaud's conjunctivitis, with negative results.

In the clinical differentiation of Parinaud's conjunctivitis from conjunctival tuberculosis there are three facts to be taken into account, the importance of which seems to have been generally overlooked, namely, that the onset of Parinaud's conjunctivitis is relatively acute, that the glandular involvement is practically synchronous with the onset of the eye symptoms, and that the affected conjunctiva always shows one or more greyish areas, the essential lesions of the disease. These facts, it seems to me if positively established in any case are alone sufficient to exclude tuberculosis. As regards the relative frequency of these two conditions this would of course be expected to vary in different regions, but as concerns Boston and its vicinity some idea of it may be inferred from the fact that I have examined only five cases of conjunctival tuberculosis within the period within which I examined the eighteen cases of Parinaud's conjunctivitis.

#### COMMENTS.

According to my observations, both clinical and histologic, the terms, granulations, polypoid vegetations, ulcers, and erosions, are not strictly applicable to any of the lesions of Parinaud's conjunctivitis. I have never seen actual loss of substance occur so that no doubt the terms erosions, and ulcers, described in the literature usually refer to the greyish areas of endothelial phagocytosis, which are still covered by epithelium. It seems possible, however, that in more advanced cases loss of substance might occur.

The so called granulations and poly-poid vegetations do not usually arise, as these terms would suggest, from an exuberant growth of granulation tissue thru breaks in the surface of the conjunctiva, but are due to the extreme infiltration about the essential lesions, and an interstitial formation of granulation tissue, which together cause the affected conjunctiva to project more or less abruptly above the surrounding surface. For this reason they never occur on the bulbar conjunctiva but almost exclusively on the retrotarsal folds where the subepithelial tissue is most abundant.

As regards the source of the infection, my cases seem to throw no light of a positive nature. It is clear, however, that the infection is not transmitted from man to man since cases of the disease occur at long intervals; and no instance is known of an individual affected with the disease having been associated in any way with another individual similarly affected. My cases also do not lend support to the theory of animal origin, for while in four cases there was close contact with some animal, it was a different kind of animal in each case, and there was no case in which there was contact with an animal known to be diseased in any way. Moreover, inoculations of various animals all gave negative results. It is conceivable, however, that the organisms may exist as saprophytes on animals.

The fact that the incidence of the disease was greatest by far in the winter must be of great significance; but just what the meaning of this may be it is impossible at present to say. This is probably true also of the fact that males were much more frequently affected than females. The great rarity of the disease does not necessarily indicate that the leptothrices are not abundant in Nature; but may mean that only exceptional individuals are susceptible; and that slight injury to the conjunctiva is required to give the organisms entrance to the tissues. That the affected individuals have a certain degree of immunity to the disease is shown by the fact that it never be-

comes generalized and recovery always takes place in a relatively short time. Incidentally, this high natural immunity on the part of man suggests that animals also may be immune, and that transference of the disease to animals may never be accomplished.

The histories of slight but definite abrasive injuries to the conjunctiva obtained in four of my cases suggest nothing in regard to the source of the infection, but are of great importance in showing the incubation period of the disease. In two cases, the eye symptoms began three days after the injury, in one case one week, and in the other case, two weeks. The latter case was that of a child three years of age who had been scratched in the eye by a cat, and since the condition was well marked when first noticed by the father, it is probable that symptoms had been present for at least a week. These cases would seem to set the incubation period at three days to one week.

The fact that the disease is rarely, if ever bilateral, may possibly be explained on the assumption that for infection to occur slight injury to the conjunctiva is essential, or more probably by the fact that the organisms, so far as I can determine, occur exclusively in the areas of endothelial phagocytosis beneath the intact epithelium, and hence do not get into the conjunctival secretion. In either or both of these ways also may be explained the fact that the disease is never transmitted from one individual to another, altho here again the question of natural immunity may enter.

It is noteworthy that all of my cases were unilateral and that in none of them was the cornea affected. In the literature, however, there are a few cases recorded in which both eyes were affected and a few also in which the cornea was involved. Such unusual cases, it seems to me, should not be accepted as authentic unless they are shown to possess the characteristic histologic changes described by me, and leptothrices are demonstrated in the lesions. Most of the cases in the literature are single cases reported by ob-



servers who have had no previous experience with the disease and who are therefore not in position to make an accurate clinical diagnosis. It would, therefore, seem best, in fact, to accept no diagnosis of the disease based on clinical findings alone.

#### DESCRIPTION.

In conclusion, it seems to me, I can best summarize my observations on Parinaud's conjunctivitis by giving the following brief description in which I have attempted to correlate the clinical, histologic, and bacteriologic features of the disease:

Parinaud's conjunctivitis, or leptothricosis conjunctivae, is a subacute inflammatory condition of the conjunctiva due to infection with a minute leptothrix, and is always associated with inflammatory enlargement of the preauricular or other regional lymph glands. The source of the infection is unknown. In some cases there is a history of slight trauma to the conjunctiva preceding the infection. The incubation period is from three to seven days. The glandular enlargement is synchronous with the onset of the ocular symptoms. The essential conjunctival lesions consist of focal areas situated immediately beneath the epithelium, infiltrated with endothelial phagocytes in various stages of necrosis. Clinically these foci appear as opaque greyish areas from about  $\frac{1}{2}$  mm. to 4 mm. in diameter. In individual cases they may be single or multiple, and may occur in any part of the conjunc-

tiva including the bulbar portion. They contain the leptothrices in great numbers. Beneath these areas more or less granulation tissue is produced which may cause the conjunctiva to project in the form of polypoid nodules. The latter occur chiefly on the fornices. Ulceration seldom if ever occurs. In the affected regions, the conjunctival tissue is congested, edematous, and densely infiltrated with chronic inflammatory cells, among which plasma cells largely predominate. In marked cases this causes the fornix to become everted and to project like a curtain over the cornea. Frequently the normal conjunctival lymph follicles are greatly enlarged. The congestion and edema extend through the whole of the lids so that in severe cases ptosis may result. The conjunctival secretion is slight in amount and mucopurulent in character. The cornea is unaffected. The local subjective symptoms are not severe, and constitutional symptoms are slight or entirely wanting. The affected glands seldom break down.

The disease is almost if not always unilateral, attacks almost exclusively children and young adults, and males more frequently than females. It is most prevalent in winter, and, so far as known, is never transmitted from one individual to another. The most efficient treatment is excision of the grey areas and nodules. The duration of the eye symptoms after this treatment is from one to five weeks. The glandular enlargement may persist for a considerably longer period.

#### REFERENCES.

1. Verhoeff. Parinaud's Conjunctivitis, a mycotic disease due to a hitherto undescribed filamentous organism. *Arch. of Ophth.*, 1913, v. 43, p. 345.
2. Wherry and Ray. *Journal Infectious Diseases*, 1918, v. 22, p. 554.
3. Bernheimer, S. Ein beitrage zur Parinaud's Konjunktivitis. *Klin. Monatsbl. f. Augenh.*, 1906, v. 44, p. 323.

#### EXPLANATION OF PLATE.

Plate XIV.—Showing characteristic lesion of Parinaud's conjunctivitis. The entire lesion, which is unusually small, is included in the field. The central area beneath the epithelium—area of cell necrosis—contains chiefly endothelial phagocytes, loaded with chromatin fragments. Many of the phagocytes show nuclear pycnosis or fragmentation and other evidences of necrosis. The area is being invaded by granulation tissue from below, and is surrounded by chronic inflammatory cells which here consist almost exclusively of lymphocytes. Just beyond the limits of the illustration plasma cells greatly predominated. Other sections of this lesion, specially stained for the purpose, showed it to contain relatively few leptothrices, owing evidently to its small size. Zenker's fixation. Celloidin section. Hematoxylin and eosin. Zeiss oc. 18, obj. A.A.



# TRANSIENT RELAPSING ENOPHTHALMOS OF SYMPATHETIC ORIGIN.

JOSÉ DE J. GONZÁLEZ, M. D.

LEÓN, MEXICO.

The case here reported differs materially from the conditions of enophthalmos described in the text-books in the striking features of the attacks and the association of enophthalmos with pregnancy. Translated from the Spanish by M. Uribe-Troncoso, M. D.

The opportunity has been offered to me for observing a very interesting case of transient enophthalmos, with some unusual features, making it worth recording.

Mrs. C., 25 years old, from Aguascalientes, Mexico, well built and strong, has always been in good health. No history of neuropathic disease could be elicited. She was married a year ago and almost immediately showed signs of pregnancy. On the third or fourth month, without any apparent cause, when dressing her hair before a mirror, she felt suddenly that her left eye sank in the orbit, a fact that she could immediately verify at the mirror; the eye appearing smaller and sunken and the palpebral fissure narrower. Moreover, the skin on both lids became entirely white and bloodless. She was very much frightened, and went to her husband and other persons in the family, who were able to verify these symptoms. A sensation of torpidity and difficulty of moving the lids and the eyeball were present.

After fifteen minutes of this paroxysm the skin of the lids became colored, the palpebral aperture widened and the eye came forward. The patient thought all was over, but two or three weeks afterwards the condition returned and then reappeared several times at irregular intervals.

The family physician sent the patient to me. I had the good fortune of witnessing one of the seizures. The syndrome began with marked paleness of the left side of the face, specially noticeable in the lids and conjunctiva, which were completely bloodless. A few minutes later the patient had the sensation of sinking of the eyeball; and an examination revealed a narrow-

ing of the palpebral fissure, ptosis of  $20^{\circ}$ , measured with the perimeter, and a recession of the eyeball in the orbit of about five millimeters.

The pupil was smaller than that of the other eye. The patient was able to lift the upper lid only to a very limited degree. The brow on the side of the ptosis was not drawn up, and there were no wrinkles on the forehead, as is the case when there is a palsy of the levator. On the contrary, the brow was lower and the wrinkles were formed on the lids themselves, as in the pseudo-paralytic ptosis of hysteria, which is due to a contraction of the orbicularis.

The movements of the eyeball were difficult and delayed, but the excursions were normal. The fundus showed no signs of abnormality. Intraocular tension was diminished.

After fifteen or twenty minutes the skin of the lids recovered its color, the palpebral aperture widened, the eyeball advanced in the orbit and the whole paroxysm ended, only leaving the patient much frightened and greatly depressed. A careful examination made afterwards failed to detect any abnormality in the eyes. Refraction was normal; the mobility of the pupil and eyeball normal. Vision = 1, in both eyes. Visual fields and color vision normal; as were also the conjunctival and corneal reflexes.

The diagnosis in this case is not difficult; we are dealing with a transient, relapsing enophthalmos, attended with ptosis, myosis, hypotension and spasm of the cutaneous and mucous vessels, due to a nervous disturbance; the motor, sensitive and angiospastic symptoms being characteristic. But to what part of the nervous system must they

be ascribed? What is the anatomic diagnosis?

There are paradoxical symptoms which are difficult to interpret if we are going to be guided only by the physiologic experimentation. In fact, the intense paleness of the lids and conjunctiva on the left side alone, the narrowing of the palpebral aperture, the diminished intraocular tension, the enophthalmos and myosis, are all symptoms of a disturbed condition of the sympathetic nerve on one side.

According to physiologic investigation, paralysis of the sympathetic produces:

(a) Retraction of the eyeball due to paralysis of the smooth muscular fibres of Tenon's capsule.

(b) Narrowing of the palpebral aperture due to paralysis of the smooth muscles of the lids, which cannot balance the stronger and opposing action of the orbicularis.

(c) Myosis, which may be due either to a paralysis of the dilatator iridis or, as others point out, to the suppression of the inhibitory action of the sympathetic upon the sphincter of the iris.

(d) Diminished intraocular tension.

(e) Dilatation of the blood vessels, showing itself by redness of the skin, of the conjunctiva, ear, auricle, etc.

However, in my patient, instead of the last symptom there was the opposite condition: a marked angiospasm of the skin and the conjunctiva, undoubtedly due to a stimulation of the sympathetic. How can we explain these contradictory symptoms? In the first place, the physiology of the sympathetic is still surrounded by darkness, and the pathologic physiology

sometimes produces true dissections; that is to say, separates the functions of one organ in different ways. It is a well known fact that the cervical sympathetic gives to the vessels, not only vasoconstrictive fibres but also vasodilator; whose antagonistic effect maintains the vascular balance. If we suppose that the paralysis was confined only to the vasodilators, leaving intact the action of the opposite fibres, then the predominant action of the former will produce the paleness of the skin and conjunctiva; symptoms not really of stimulation, but only of lack of the opposite action or tonus.

In regard to the cause of this transient paralysis of the sympathetic, it is necessary to suppose in the absence of any other cause that it was due to pregnancy. The influence of pregnancy upon some trophic disturbances, which are due to the sympathetic, is now well admitted, i. e., the so called cutaneous syndrome, pigmentation around the nipples, the pigmentary line on the abdomen, pigmentation of the face, etc. We are probably not far away from the real fact in considering this relapsing sympathetic paralysis as due to pregnancy.

What is more difficult to ascertain is, if it is due to a purely reflex action; or to the toxins arising from pregnancy and circulating through the system. In favor of a reflex action is the rapidity of the outbreak and its transient character. But an influence of the autotoxins upon the ganglion cells of the sympathetic cannot be excluded. An elective action may be produced just the same as strychnin has a selective convulsive action, morphin an analgesic effect and curare only acts upon the motor terminations of the nerves.

# GLIOMA OF RETINA, WITH REPORT OF THREE CASES TREATED WITH RADIUM.

REX DUNCAN, M. D.

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The cases here reported seem to indicate that radium exposures will cure at least some cases of glioma. This paper was read before the Eye, Ear, Nose and Throat Section of the Los Angeles County Medical Society, March 1918. With four illustrations.

Glioma is the only neoplasm occurring primarily in the retina, according to Fuchs, and is essentially malignant. It is found usually in children under four years of age. Curt Adam (1) reports that from the records of 47 cases studied, 94 per cent were under four years of age, and all were less than 12 years old.

Cases have been reported in which the condition was present at birth. While heredity as an etiologic factor seems improbable, O'Connor (2) quotes a number of reports in which several children of the same family were afflicted.

Glioma retinae is usually unilateral, altho both eyes are involved in 15 to 20 per cent of the cases reported. The clinical course of glioma has been so well described by von Graefe (3) and others, that a repetition here seems superfluous. However, I wish to refer briefly to the progress of this disease. In the first stage, the disease manifests itself by blindness and a peculiar yellowish reflex emanating from the pupil, which has caused the condition to be known as "Amaurotic Cat's Eye." Inflammatory symptoms are absent. In the second or glaucomatous stage, there is increased tension and the eye becomes irritated and painful, altho occasionally the eye shrinks and temporarily assumes the characteristics of phthisis bulbi. In the third stage, the tumor grows out from the eye and involves the orbit, or extends along the optic nerve to the brain. Ultimately, the eye is transformed into a large, bulging, ulcerated, bleeding mass, filling the orbit and projecting out thru the lids. In the fourth stage, there occurs metastasis into the adjacent tissues and lymphatic glands. Usually

the bones of the skull and face are involved, and later the other organs and viscera. Death results from exhaustion or the involvement of the brain or other vital organs.

In considering the diagnosis, and results of treatment, in these cases, great care must be taken to exclude pseudoglioma and only those cases should be considered in which a definite microscopic diagnosis has been made. A report from Moorfield's Hospital for 1888 to 1893 indicated that 7 of 24 eyes enucleated for glioma were found to be pseudo growths. Krauss (4) states that Treacher Collins found in 7 cases out of 24 eyes enucleated for glioma that the diagnosis was incorrect; Vesch and Isler, 4 times in 41 cases; Haab, 5 times in 20 cases; and, Greef, 4 times in 21 cases. No doubt, errors of diagnosis are quite as common in private practice, and cases have been reported as cured which were in fact cases of a benign pseudo growth.

Early diagnosis and prompt treatment are the important factors in these cases. Fuchs, quoting Leber, states that enucleation in early cases, when the neoplasm is confined within the eyeball, results in almost 40 to 50 per cent cures. Extension into the optic nerve beyond the point of excision, or perforation of the eyeball and involvement of adjacent tissues, or metastasis or recurrence after enucleation renders the prognosis, surgically, practically hopeless. The following review of individual cases reported in recent literature, would suggest that this condition is not diagnosed early and shows a high mortality.

Stieren (5) reports the following three cases: Male, 2 years 5 months of age, bilateral glioma. Died un-



treated 2 months after diagnosis. Female, 3 years 4 months, with unilateral glioma. Immediate enucleation, followed by death in 3 months from cerebral involvement. Female, 7 years, unilateral glioma, tumor involving nerve-head, and confined within eyeball. Enucleation and patient apparently well 18 months later.

Reeder (6) reports: Male, 7 years. Glioma retina, bilateral, with extension without to orbital tissues. Bilateral enucleation and death soon after from sepsis and general metastasis.

Stieren (7) reports: Male, 16 months. Unilateral glioma retina involving all the structures of the eyeball and orbit, with metastasis in antrum and buccal mucous membrane, resulting in death from asphyxiation 10 weeks later.

Hoster (8) reports: Male, 22 months. Unilateral glioma retina, with enucleation, followed by recurrence.

O'Connor (9) reports: Female, 9 months. Glioma of retina and atrophy of bulb with metastasis into superior maxilla. Eye was enucleated but death followed in 2 months.

Obviously, the prevention of recurrence after early enucleation, and the treatment of late and recurrent cases, which comprise a high percentage of the total, are of the utmost importance. A somewhat detailed report of the following three cases is, therefore, of interest:

Case No. 1, referred to me by Dr. Frank Miller, whose report is as follows:

"J. R. W. Age, 6 years, male. Patient had never noticed any disturbance of vision or abnormal condition until forty-eight hours previous to my seeing him, when patient's mother noticed that eye was quite reddened and he complained of considerable pain. This condition increased until the pain was intolerable.

On examination, found eye with a very marked increased tension; intense ciliary injection; cornea clear; pupil dilated and fixed. Immediately behind the lens there presented a tumor mass.

A diagnosis of intraocular malignancy was made.

Immediate enucleation advised and performed. Nerve resected in the apex of the orbit. On sectioning the eye, (see Fig. No. 1) large intraocular glioma together with involvement of the optic nerve at point of resection.



Fig. 1.—Case 1. Cross section of the eye showing glioma. Microscopic section showed nerve-head involved at the point of resection.

The case was immediately referred to Dr. Duncan for radium treatment. At this date, 18 months after operation and radium treatment, there has been no evidence of recurrence."

Enucleation was performed August 10, 1916, and radium treatment begun August 18th. Three applications of radium were made, employing 50 to 125 mgrms., screened with 0.5 mm. of platinum and 1.3 mm. of brass, covered with gauze and rubber. The applicator was placed, and retained, well back into the orbital cavity and the tissues anterior protected. There began about 6 days after treatment, a slight inflammatory reaction of the orbital tissues, which subsided after about 2 weeks. As previously stated, there is no evidence of recurrence after more than 18 months.

Case No. 2, referred by Dr. Ross A. Harris. Dr. Frank Miller, who first saw the case at the Children's Hospital, reports the condition at that time as follows:

"Anna M., age 2½ years, female. Patient first seen August, 1916. Tumor

mass discovered in vitreous. Pupil dilated and fixed. Considerable exudate in anterior chamber. Cornea clear.

Advised immediate enucleation which was refused. Patient did not return for nine months at which time the eye was painful and quite hard. There were several bulging areas on the anterior part of the sclera thru which choroidal pigment showed quite clearly.

Immediate enucleation was performed with resection of the nerve as far back as possible. On section, the eye was filled with glioma, (see Fig. No. 2) and microscopic section showed the nerve tissue was involved also.

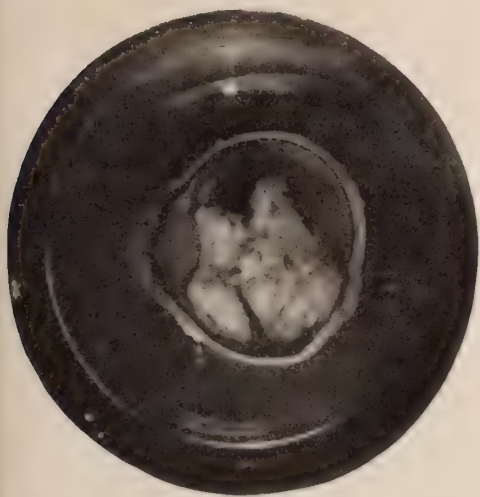


Fig. 2.—Case 2. Cross section of the eye showing glioma. Microscopic section showed nerve involved at point of resection.

Instructions were given to return the child every week for observation, but she has not been seen by me since."

This case was seen by Dr. Ross A. Harris in October, 1917, and immediately referred to me for radium treatment. There was present extensive involvement of the orbit with a tumor about 4 cm. long, extending 2 cm. below the orbit. The lymph nodes over the left parotid enlarged and palpable. Child anemic and poorly nourished. Radium treatment was begun October 24th. A 50 mgrm. tube of radium, screened with platinum, was placed

thru a puncture incision into the infra-orbital tumor and 60 mgrm., screened with platinum and brass, placed in the orbital cavity. Several treatments were given, which resulted in a rapid absorption and disappearance of the orbital involvement in about three weeks. The glands were treated at the same time and disappeared. The patient did not report for observation, as instructed, until about one week ago, at which time I found some slight enlargement in the superficial cervical glands. This is improving under treatment and the prognosis is hopeful, if the patient will stay under treatment and observation, which is, however, doubtful.

Case No. 3, referred by Dr. W. H. Roberts, whose report is as follows: "P. R. C., Jr., was brought to our office, September 16th, 1916, when he was twenty-seven months old. The parents stated that for a year or more they noticed that the right eye turned out at times. There was no evidence of pain.

Examination showed a golden-yellowish reflex in the pupillary area, the typical " Amaurotic Cat's Eye." The pupil was dilated and inactive. The eyeball was not congested. There was no increase in tension. The vitreous chamber was filled with a whitish growth. The retina appeared to be detached and crowded forward by this growth. Nothing was found in the left eye.

A diagnosis of glioma of the retina was made and concurred with by Drs. Macleish and Mansur. Immediate enucleation was advised. This was done on September 22nd, 1916. A portion of the optic nerve, external to the globe, was removed and sectioned at once, and under the microscope shown to be free from any malignant growths.

The eyeball was sent to Dr. E. B. Burchell, at the New York Eye & Ear Infirmary, who made a gelatin mount of one-half (see Fig. No. 3), and he prepared sections from the other. His pathologic report is as follows: "The growth is that of glioma; it involves the whole retina, right to the lamina



cribrosa, but does not pass thru the iris, which is adherent to the posterior layer on the cornea, showing that the eye is in a glaucomatous stage. The large vessels of the choroid appear to be infiltrated with the tumor cells."



Fig. 3.—Case 3. Cross section of the eye showing glioma. Microscopic section showed nerve not involved at point of resection.

Following the operation, the child made a speedy recovery, and showed no evidence of any return of the tumor, until the 24th of April, 1917, when he was brought into the office because two days before a slight discoloration was noticed in the orbit.

Examination showed, a little to the nasal side of the central part of the orbit, a slight bluish discoloration, and with the finger, a mass could be felt. Nothing could be seen in the other eye.

Following this, X-ray treatments were used, but the growth slowly enlarged.

On the 19th of May, he was referred to Dr. Rex Duncan for radium treatment, and by the 8th of June, the tumor in the orbit had entirely disappeared.

May 24th to 29th, the patient received three treatments employing 50 to 110 mgrms. of radium element. As stated, there occurred a rapid absorption of the tumor. There resulted a

slight inflammatory reaction which completely subsided in about three weeks. The cosmetic result is perfect, except for the loss of the eyelashes. (See Fig. No. 4.)

While the three cases above reported are too few to justify definite conclusions, in view of the frequency of recurrence and high mortality following surgical treatment alone, the results obtained in these, and similar cases, would seem to warrant the following conclusions:

In early cases, immediate enucleation, followed by immediate prophylactic radium radiation, would prevent a high percentage of recurrences;

In later cases, in which the nerve stump or orbital tissues are also involved, immediate enucleation, followed by proper radium treatment, should be employed;

In recurrent cases, radium therapy is a most effective method of treatment.



Fig. 4.—Case 3. Glioma Retinae Recurrens gradually increased under X-ray treatment. Responded promptly to radium and apparently well more than fifteen months after treatment.



## BIBLIOGRAPHY.

1. Adam, Curt., *Ztschr. f. Augenh.*, 1911, XXV, 330.
2. O'Connor, Dennis F., *Arch. of Ophthal.* XLVI, No. 4, 298.
3. Von Graefe's *Archiv. f. Ophthal.*, Bd., XIV, 2, P. 103.
4. Krauss, Frederick, *Ophthal.* IX, 3, P. 358.
5. Stieren, Edward, *Ophthal. Rec.*, March, 1910.
6. Reeder, D. F., *Ophthal. Rec.*, Feb., 1914.
7. Stieren, Edward, *Penn. Med. Jour.*, June, 1914.
8. Hoster, J. H., *Pediatrics*, May, 1916.
9. O'Connor, Dennis F., *Archiv. of Ophthal.*, July, 1917.

## PLASMOMA OF THE CONJUNCTIVA (PASCHEFF).

KAZUO HIWATARI, M. D.

KYOTO, JAPAN.

This is a report of three cases with histologic examination of the involved tissue seeming to show that plasmoma of the conjunctiva should not be regarded as a new growth. Translated from the German by H. Aufmwasser, M. D. With two illustrations.

Since the first publication of Pascheff, about plasmoma of the conjunctiva, numerous cases have been reported as belonging under this heading from different countries—Bulgaria, Hungary, Prussia, Russia and Japan.

Clinically this tumor appears at times as a diffused, again as a circumscribed thickening of the conjunctiva or the cornea. Processes of irritation are rarely observed in these cases. Youthful individuals below thirty years of age mostly are affected. About half of the cases (11 in 22) show trachomatous changes, as pannus of the cornea, trachoma, follicles, etc.

Histologically this tumor is characterized by a special abundance of plasma cells. The question of the pathogenesis of this tumor is until now not fully clear. A number of authors (Rund, Deutschmann, etc.) look upon it as a true neoplasm of the conjunctiva; whilst others (Pascheff, Rados, Sawada, Shikano, Fudiwara,) look upon it as a kind of inflammatory granuloma, which has a close relationship to trachoma.

It may not be without interest to relate the following three histologically examined cases, belonging under the heading:

CASE 1.—Woman, age 26 years; farmer. History: Since ten years old the patient is supposed to have had trachoma; and since the last two years

she noticed a gradual swelling of both lower lids. The excised piece of conjunctiva taken from the right lower lid, with the tarsus, was sent to me by one of my colleagues for histologic examination.

Histology: The conjunctiva showed distinctly a papillary overgrowth. The subepithelial tissue is diffusely permeated with typical plasma cells, other kind of cells are found sparingly only. Very prominent is the frequent appearance of Russel's bodies. Between the epithelium and this infiltration of plasma cells, there is imbedded in places a stratum of connective tissue of different thicknesses; which we look upon as scar tissue. This infiltration with plasma cells is of varied thickness, in one place of such a degree that it appears to be a real tumor. The epithelial layer above, which everywhere shows papillary hypertrophy, was more or less distinctly flattened by pressure. At another place where the plasma cellular infiltration was only sparsely developed, the histologic picture is very similar to that of trachoma. Towards the lower portion, the fibrous connective tissue gradually increases at the expense of the plasma cells; so that between the conjunctiva and the tarsus a layer of dense connective tissue is interposed. The latter here and there shows powerful development and hyaline degeneration. In the tarsus

we see again a plasmacellular infiltration. The Meibomian glands mostly are atrophied.

CASE 2.—Servant girl 18 years old. The general examination except some glandular swellings, is negative. Examination of blood is negative. For years she complained of slight secretion of both eyes, and of ptosis of the left upper lid. In everting the lid, the conjunctiva was found visibly thickened, especially in some places to miliary nodules and to nodules of the size of a small pea. Slight scar formation in some places can be demonstrated. The lower conjunctiva is only slightly hyperemic. On the right eye no tumor formation can be demonstrated; but in the upper conjunctiva we have a trachomatous thickening of the conjunctiva.

Histology. A nodule from the for-

plasmacellular infiltration, in that part of the conjunctiva bulbi immediately adjoining the tumor; which was extirpated along with the rest and clinically looked absolutely intact. Fig. 1. b.

CASE 3.—A working woman age 20 years, with tonsillar hypertrophy and swelling of the lymphatics of the neck and paleness of the external skin. On the right eye of this woman a severe ptosis was noticed, she could not open the eye spontaneously. On everting the upper lid, which could be done only with great difficulty on account of its rigidity, the tarsal conjunctiva and fornix showed a diffuse, hard thickening of pale color. The thickness was of such high degree that the piece of conjunctiva excised for histologic examination measured in thickness about 4 mm. The conjunctiva of the lower lid and the transition fold are diffusely

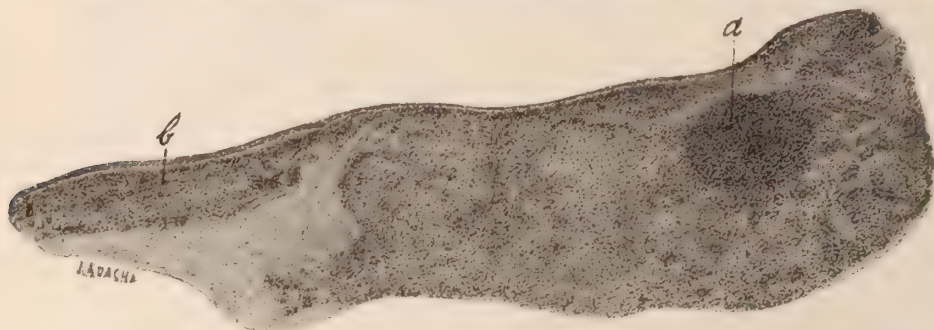


Fig. 1.—Plasmoma of Conjunctiva (Hiwatari) Second case. Showing Russell's bodies and connective tissue between epithelium and tumor.

nix is taken and examined. This nodule consists almost exclusively of typical plasma cells in dense formation, and polynuclear leucocytes sparingly dispersed. In the center of the nodular accumulation of plasma cells lies a small elevation of tightly compressed lymphocytes, which toward the periphery, without sharp demarcation, intermingle with the surrounding plasma cells. Fig. 1. a. Russell's bodies are also present in large numbers. Between the epithelium and the tumor there is a stratum of dense connective tissue, which sends a few fine branches deeply between the plasma cells.

What appeared remarkable in this case, is the presence of a fairly strong

scarred, on the cornea above pannus-like changes. The conjunctiva of the left eye showed also old trachomatous changes.

Histology: The thickening of the conjunctiva presents here also massive accumulation of typical plasma cells, the other migratory cells are sparingly formed. Russell's bodies were not present. Deeply, the infiltration, as in the first case, becomes slighter; and in its place a fibrous connective tissue, poor in cells, is found. Immediately beneath the epithelium, which is more or less flattened, is a thin sheath of scar tissue. A few connective tissue bands, which running obliquely or horizontally, combined the latter with the



above mentioned deeper lying scar, divide the plasma cellular infiltration in different parts. Fig. 2.

As it can be seen from each description, there is no doubt, that my cases here presented are plasmoma of the conjunctiva. The histologic findings in general are equivalent with those heretofore described.

What I wish to accentuate as specially important, is: (1) the presence of a distinct scar formation in all cases, (2) the appearance of plasmacellular infiltration in the conjunctiva adjacent to the tumor, which clinically showed nothing pathologic (Cases 2 and 3) the existence of clearly visible trachomatous changes on the second eye.

numbers always are found in the tumor or tissue, is not in accord with this conception. Regarding the appearance of scar tissue in the plasmoma, I find these described in the literature only in one case of Rados, whilst I have found the same in all of my three cases. It might be important later on to take notice of those findings. Therefore today, without doubt, we have to look upon the plasmoma as a kind of inflammatory granuloma. The fact that plasmoma cases up to now have been reported from trachoma countries only, is in favor of this conception. The plasmoma probably etiologically is identical with trachoma, and can be distinguished from genuine trachoma by its

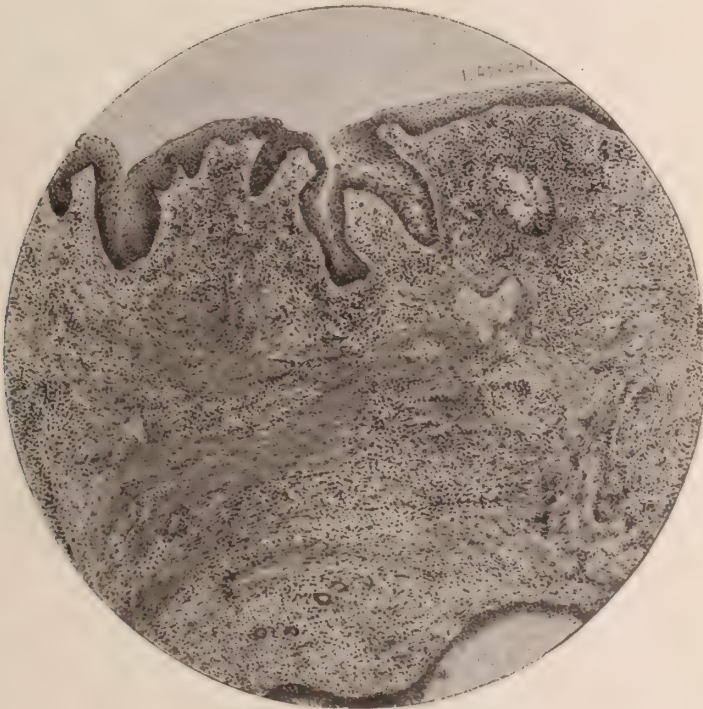


Fig. 2.—Plasmoma of Conjunctiva (Hiwatari). Third case. Showing accumulation of plasma cells infiltration and fibrous connective tissue.

Rund and Deutschmann have regarded plasmoma of the conjunctiva as a genuine tumor. My above observations are entirely against this conception, without needing an especial explanation. The opinion of Rados, that polynuclear leucocytes in small

form of appearance only. It is a well known fact that the granulating inflammation in general occurs in two forms, in a pathologic or anatomic sense as well as clinically. The one is a diffused exuberation of granulation tissue, while the other is the formation of the



socalled inflammatory granuloma. As long as it is certain that trachoma is a kind of granulating inflammation, as it is generally accepted today; so it is

entirely natural that in trachoma there is formed a tumorlike thickening of the conjunctiva, just as in tuberculosis, solitary tubercles are developed.

#### BIBLIOGRAPHY.

1. Pascheff, Graefe's Arch. f. Ophth. Bd. 68. S. 114. 1908.
2. Pascheff, Graefe's Arch. f. Ophth. Bd. 71. 1909.
3. Rund, Zeitschr. f. Augenheilk. Bd. 26. S. 97. 1911.
4. Deutschmann, Zeitschr. f. Augenheilk. Bd. 27. S. 242. 1912.
5. Rados, Zeitschr. f. Augenheilk. Bd. 29. S. 125. 1913.
6. Lewitsky, Klin. Monatsbl. f. Augenheilk. Bd. 52. I. S. 748. 1914.
7. Pokrowsky, Klin. Monatsbl. f. Augenheilk. Bd. 51. II. S. 137. 1912.
8. Sawada, Nippon-Ganka-Gakkwai-Zassi. Vol. 13, S. 25. 1909.
9. Kuboki, Nippon-Ganka-Gakkwai-Zassi. Vol. 15. S. 502. 1911.
10. Shikano, Nippon-Ganka-Gakkwai-Zassi. Vol. 15. S. 581. 1911.
11. Shinohara, Nippon-Ganka-Gakkwai-Zassi. Vol. 16, S. 105. 1912.
12. Matsumoto, Nippon-Ganka-Gakkwai-Zassi. Vol. 5. S. 105. 1912.
13. Fudiwara, Nippon-Ganka-Gakkwai-Zassi. Vol. 18. S. 1141. 1914.
14. Nakano, Nippon-Ganka-Gakkwai-Zassi. Vol. 19, S. 1100. 1915.
15. Seo, Nippon-Ganka-Gakkwai-Zassi. Vol. 20. S. 1231. 1916.

### SOLID EDEMA. REPORT OF THREE CASES.

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NEW YORK CITY.

The cases here reported were submitted to vaccine treatment and did well under it. Read before the American Ophthalmological Society July 9th, 1918. With four illustrations.

Solid edema of the face was a comparatively new disease to me until I found a reference in Albutt and Rolleston's System of Medicine, volume IX, page 183, describing it as a recurrent and later a persistent edematous swelling without pitting, and characterized as "Solid Oedema" by Sir Jonathan Hutchinson, involving the whole or limited portions of the face, such as the eyelids or one of the lips, and has long been known and described under such names as "recurrent erysipelas" (J. Hutchinson), "erysipelas persistans faciei" (Kaposi), "erythema persistans faciei" (Kreibush), "lymphangitis faciei" (S. MacKenzie), and as persistent lymphatic edema. There are recurrent attacks at short, long and irregular intervals, in which the skin swells, sometimes with redness and signs of inflammation but more often not. The part attacked becomes edematous in such a way that pitting on pressure is absent.

In many cases there are no febrile or other constitutional disturbances; only

the local discomfort, such as the photophobia, lachrimation and eczematous eruption about the eyelids and nose, and interference with breathing and inability to cleanse and free the nares from the crusts and scales as was observed in cases 1 and 3. The first attack is usually the most severe, the later recurrences milder. The edema does not always clear up entirely between the attacks, especially is this true of the upper lip.

The etiology is not definitely settled, but the general impression is that the condition is due to a streptococcic infection, and that it resembles the recurrent attacks seen in the other parts of the body, such as the arms or legs; where it may induce in time a form of elephantiasis. In none of my cases here reported was the streptococcus found, but in all the staphylococcus pyogenes albus and aureus, and in case No. 2 there was a diplobacillus found.

There is evidently a direct absorption of the toxins elaborated by the

strepto- and staphylococci in the nasal mucosa, and this in turn causes the edema of the cellular tissues of the lids,



Fig. 1.—Case 1. Showing marked swelling of left lids, upper lip, and right cheek.

cheeks and lips. In nearly all of the cases the nose has been found to be the site of the dermatitis, and a minute search should always be made in the nose, eyes, mouth or sinuses, for any possible source of the infection. Exposure to cold may favor the attacks.

**DIAGNOSIS.** — Recurrent localized swellings or edema of the lips, nose, cheeks and eyelids may simulate angioneurotic edema, and when the whole face is involved at first glance might suggest myxedema, leprosy, dropsy or pernicious lymphedema.

Kriegedema reported as occurring among some of the Russian soldiers in the present war affects, as a rule, the legs, thighs, genitalia and the eyelids. This is thought to be due to under feeding and especially to the absence of fats in the diet.

**CASE 1.**—Miss R. S., aet 12, Russian Jewess, states that when 5 years of age, eyelids, nose and upper lip were swollen, with some photophobia and lacrimation, which lasted for a few

weeks. At 10 years of age a recurrence of this swelling which was more limited to nose and upper lip. She was told by one physician, who saw her at this time, that it was due to a "boil" in the nose. But the school doctor, who also saw her at this time, said it was erysipelas. About six months before she came to the Manhattan Eye and Ear Hospital, she was treated at the New York Skin and Cancer Hospital for several months, but without any relief.

February, 1916, when I first saw her, the condition was as follows: A very marked swelling of the upper and lower lids of both eyes. Severe photophobia and lacrimation, with blepharitis. Some swelling of both cheeks, and the nose was swollen to about one-half again its normal size. The nares filled with crusts and scales with some discharge. The nose was tender and painful to touch. The upper lip was enormously enlarged, and the affected parts of the face were firm to the touch. There was no pitting on pressure and there was little or no redness.

The urine, Wassermann and von Pirquet were all negative. The report from the rhinologist gave us no mate-



Fig. 2.—Case 1. Showing the patient one year later.

rial help in making a diagnosis of the trouble. She was referred to the laboratory to have a culture made of the nose, and the report came back that a pure growth of the staphylococcus pyogenes aureus was found. A vaccine was made and the injections were given.

Four days after the first injection was given an abscess at the site of the injection followed and was later opened and drained. These injections were continued over a period of about two months with a gradual subsidence of all of the ocular symptoms and the swelling of the nose, cheeks and lips gradually disappeared.

There was some douching of the nose by the patient, but no other treatment was given after the vaccine was started. I did not see the patient again until the fall, and the face was apparently normal.

There has been no acute recurrence of the trouble.

CASE 2.—Miss J. G., act 9, Italian parentage, family history negative, has had measles, scarlet fever and pneumonia. Had been under treatment for phlyctenular keratitis two years previously and was cured by the use of tuberculin injections. Returned to the clinic with a recurrence of the keratitis and associated with this condition was a marked swelling of the left cheek, nose and the upper lip. About the openings of the nares was some redness, scabbing and scaling of the skin. There was some tenderness of the nose on palpation.

The present trouble began in September, 1917, with bleeding from the nose, which was shortly followed with swelling of the upper lip and later extended into the left cheek and lids. Was treated by her family physician, who gave tonics and ointments with no improvement. This condition has lasted about five months with recurrent attacks, but the swelling of nose and lip never entirely disappeared.

A culture was made from the nose and the staphylococcus pyogenes aureus and a diplobacillus were found, and a vaccine was made.

Injections were given on the following dates:

- 4. 27. 18, vaccine gtts IV.
- 5. 4. 18, vaccine gtts VI.
- 5. 8. 18, vaccine gtts VIII.
- 5. 11. 18, vaccine gtts X.
- 5. 16. 18, vaccine gtts XII.

Patient was then referred to Bellevue for continued treatment.

- 5. 25. 18, vaccine gtts XIV.
- 6. 1. 18, vaccine gtts XIV. followed by local reaction.
- 6. 15. 18, vaccine gtts XIV.
- 6. 23. 18, vaccine gtts XV.



Fig. 3.—Case 2. Showing great swelling of lips and nose. Some swelling of both lids.

Patient was given atropin locally for the keratitis with the injection of tuberculin. The eye symptoms were relieved in about a week, and the swelling of the face gradually disappeared. During the treatment of this case cultures were made from time to time after she was referred to Bellevue, and the staphylococcus pyogenes albus was found; but the first made vaccine was continued.

Her brother, who brought her to the clinic, had had recurrent attacks of



phlyctenular keratitis, and was given tuberculin with relief of the condition. Some trouble with his nose caused us to make a culture. We found the Klebbs-Loeffler bacilli. He was given antitoxin and referred to the Willard Parker Hospital for treatment, and was discharged three weeks later, at which time his nasal cultures were negative.

CASE 3.—Mrs. F. P. U., aet 48, family and personal history negative, except for scarlet fever in childhood, and recurrent attacks of a condition that was diagnosed as erysipelas.

First attack at 15 years of age, involving head and face, hair fell out after a very severe attack.

Second attack at 18 years of age, illness lasting about two weeks, affecting face and head. During the next few years she would have recurrence of the erysipelas eruptions on face, especially affecting the eyelids, nose and mouth. The tear ducts and nose began to give trouble. Difficult breathing and more or less constant epiphora.

Nasal inflammation extended to pharynx and larynx, causing a cough the year around. The nasal and throat trouble had been a constant source of annoyance during all these years. The nose condition became so bad that a radical operation upon the ethmoids and frontal sinus was advised, but was refused. Paralysis of the facial nerve on the right side about five years ago, which was cured after six months of treatment.

Patient was referred to Dr. George MacKee for a dermatologic diagnosis, by Dr. Lane of New Haven, Connecticut, who in turn referred the patient to me for a nasal and ocular examination. X-Ray examination by Dr. MacKee showed the accessory sinuses to be normal. "The only suspicious area that he found in the alveolus was at the apex of the superior right second bicuspid. This tooth should be carefully investigated."

I found at this time that the entire nose was somewhat swollen, especially across the bridge of the nose. There is some redness with small circumscribed elevations, yellow at the center, but not truly pustular. Considerable red-

ness and some swelling of the tip of the nose, local heat, and some tenderness on pressure. A considerable number of these papillary elevations present a scaling and glazing of the skin. There is a deeper redness where the affected area joins the more normal tissue of the nose, and extends along the cartilaginous septum, and involves part of the upper lip, which also is slightly swollen. The redness extending into both nares with a marked swelling of the central septal division.



Fig. 4.—Case 3. Showing swelling of nose and upper lip. Great redness, scabbing of the skin of nose and upper lip.

Dryness with scales and crusts in the nose which have existed off and on for the past 25 years. Has had more or less distinct nasal trouble during that time, which has progressively grown worse and no treatment seems to have had any curative value, only partially relieving the symptoms. The present attack has existed for about three or four months. Has pain deep in the nose and superior maxillary bones, at times.

Ears have discharged since an attack of scarlet fever and about 3 years ago

was given a "colon bacilli" vaccine, but reacted most violently to the injections which were continued over a period of three months.

A culture was made from both nares and a pure growth of staphylococcus pyogenes aureus was obtained, and a vaccine was made and the following injections were given:

- 4. 29. 18, vaccine gtts. IV.
- 5. 2. 18, vaccine gtts. V.
- 5. 6. 18, vaccine gtts. VI.
- 5. 10. 18, vaccine gtts. VII.
- 5. 15. 18, vaccine gtts. VIII.
- 5. 23. 18, vaccine gtts. X.
- 6. 3. 18, vaccine gtts. XI.
- 6. 10. 18, vaccine gtts. XII.

6. 17. 18, vaccine gtts. XIII.

6. 23. 18, vaccine gtts. XIII.

There was local treatment of the nose during the period of the injections, consisting in a thorough cleaning with alkaline spray, and applications of a 40% solution ichthyol, later a solution 50 grain silver was applied high up on the middle turbinate, with a 100 grain solution of silver about the nares, and on the surface of the nose. X-Ray was used once a week. There has been a complete relief of all nasal obstruction, and the skin surface of the nose has lost the scaliness and redness and appears to be gradually becoming like the rest of the skin of the face.

## NOTES, CASES, INSTRUMENTS

### BLUE SCLEROTICS, A NOTE UPON ASSOCIATED OTO- SCLEROSIS.

FRANK A. CONLON, M. D.

LAWRENCE, MASS.

In 1913 I published (1) "Five Generations of Blue Sclerotics and Associated Osteoporosis" and thought my investigations of this family had been complete. After reading Bronson's article (2) on "Fragilitas ossium and its association with blue sclerotics and otosclerosis," I took the first opportunity presenting itself to examine my family for the possible associated ear condition.

I was very much chagrined to find that I had overlooked this part of the symptom complex which we now know includes blue sclera, a marked tendency to spontaneous dislocation, sprain, and fracture; small stature; and otosclerosis.

I, however, take some consolation in the fact that such a careful observer as Peters of Rostock overlooked even the tendency to fractures in his first publication, and not until I had questioned him did he discover it (3).

The father of this present generation

reported by me I find has otosclerosis, and all of his family who had blue sclerotics were also deaf, and those who had normal colored sclera had normal hearing. The deafness in all cases coming on after thirty.

The age that the deafness developed in these cases is suggestive, if not conclusive, that these were also cases of otosclerosis.

None of the five girls in my family show any evidence of otosclerosis, but considering that not one is over thirty is not so remarkable.

Since publishing my article in 1913 two children have been born one with and one without the blue colored sclera. One month ago a member of the family received a bad fractured knee from rather a slight trauma.

As we are now fast becoming a military nation I think we might accept Peters' suggestion that all cases of blue sclerotics be exempt from military service.

Bronson reports out of a family of four generations, thirty-four of whom he examined, twenty-one had gray-blue sclerotics—twenty suffered from fractures and seven members had progressive deafness which was found to be otosclerosis.

Van der Hoeve and de Kleijn (4) were the first to notice otosclerosis in connection with this very interesting anomaly. Out of eleven without blue sclerotics, all were deaf and ten had broken one or more bones.

In their second family three members were deaf from otosclerosis.

Van der Hoeve says: "The blue sclera is observed when the anomaly is there; the fragility of the bones, on the contrary, can be present unobserved because an accident is necessary to put it in evidence, and deafness is progressive, so that it is not perceived before a certain age—so altho all the symptoms of the syndrome may be present only the blue scleras are noticed.

#### REFERENCES.

- (1) Conlon, F. A.: Five Generations of Blue Sclerotics and Associated Osteoporosis. *Boston Med. and Surg. Journal*, 1913, Vol. 149, p. 16.
- (2) Bronson, E., *Edin. Med. Journal*, April, 1917.
- (3) Peters, A., *Klin. Monatsbl. f. Augenheilk*, May, 1913, p. 594.
- (4) Hoeve, J. Van der, and Kleijn, A. de. *Nederl. Tydschrift voor Geneeskunde*, March, 1917.

### CANTHOPLASTY.

FRANK A. MORRISON, M. D., F. A. C. S.

INDIANAPOLIS, INDIANA.

In the April issue of this journal Dr. J. S. Wyler, of Cincinnati, describes his method of performing canthoplasty by utilizing the entire thickness of the skin to make the flap. For several years the writer has used the cuticular layer with success and reports the method for the benefit of any one who should desire to try it. Several drops of a four per cent solution of cocain are first dropped into the conjunctival sac and then the region to be operated upon is anesthetized by infiltration with a one-half per cent solution of novocain, to which is added a few drops of adrenalin. The needle is entered at the commissure, splitting the skin, and pushed templewards for approximately a third of an inch, raising the skin in

the usual bleb of infiltration anesthesia.

A cataract knife is now entered at the commissure, splitting the skin, and pushed outward for approximately a third of an inch. All this time, of course, the skin is kept on a stretch. The knife is at all times perfectly visible beneath the cuticle and this layer is separated from the cutis by "working" the point and body of the knife from side to side until the skin is split into two layers. Next an incision involving the cuticle only is made, commencing at a point about one-eighth of an inch above the commissure and passing upward and outward for a third of an inch. A similar incision starts the same distance below the commissure and extends to a like distance downward and outward.

The little flap now formed is reflected toward the temple, and then all remaining structures, including the deep skin layer, with muscle, etc., is divided with the scissors in the usual way. Finally the apex of the cuticular flap is sutured with fine silk to the middle of the original canthus and one similar suture is placed at the upper and one at the lower edge of the flap to prevent curling. The operation is easy of performance and painless. In very small children, where a local anesthetic is not used, I have infiltrated the skin with normal salt solution and adrenalin to facilitate the separation of the layers.

### BEST WAY TO STRAIGHTEN CROSS EYES

DAVID W. WELLS, M. D., F. A. C. S.

BOSTON.

Of the multiplicity of operations for correcting heterotropia, it seems fair to assume that some are more successful than others, and among those some, is it unreasonable to presume that one may be the best? Probably most operators continue the method which they have found successful and in which they have developed the most skill. If one were to approach this



question anew, how could he obtain the correct answer?

The inquirer would find equally acknowledged authorities advocating tenotomy of the strong muscle, tucking of the weak muscle, resection of the weak muscle, advancement of the weak muscle either with or without tenotomy of the antagonist, capsular advancement (Fox), musculo-capsular advancement, or some modification of some popular technic.

It must be evident that the only way to settle the question is to compare the results, and in order to do this the results must be tabulated on some sort of uniform schedule which will make comparison possible.

The report of Dr. Fernandez on his experience with the Reese operation in the American Journal of Ophthalmology, June, 1918, is an example of insufficient data. It gives the angle of deviation (probably perimetric) before operation, but what after? Simply "good result," and "failure." Now what constitutes a "good result" is open to various answers. Many a patient is satisfied with a partial correction and considers it a "good result," and it is possible the operator may share this opinion. What is a "failure?" Was no change produced? Was it a partial correction? Were the eyes straight immediately and crossed later? Or was the eye lost?

Four years ago Wells and Sternberg published\* a report of sixty-nine cases, operated by the Wells modification of the Worth advancement, giving the following data:

Indication of case and eye.

Deviation with perimeter, degrees.

Constant, (c). Occasional, (oc).  
Alternate, (alt).

Age of patient.

Age of onset.

Refraction with cycloplegic.

Vision.

Glasses ordered.

Time worn.

Deviation with Glasses on.

Fusion Training.

Previous Operations.

Advancement.

Antagonist Muscle.

Anesthetic.

Results: Perimeter, Phoria, Stereoscopic.

Remarks.

It was hoped that others would follow this example so that the results might be studied comparatively. Presumably all of us would like to adopt the method which gives best results, but this cannot be decided until results are reported on uniform schedules. Our national societies should adopt such a schedule. Probably the one presented would not meet with general approval, but it would seem possible to agree upon some form which would satisfy a majority. Naturally it is first necessary that there be some general desire to secure a correct answer to the question propounded. It is quite possible that such a study would show that one technic is best for exotropia, another for esotropia, one for high degrees, another for low degrees, but these details would be evolved once the importance of reporting results on uniform schedules were recognized.

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\*Journal of Ophthalmology, Otology, and Laryngology, September, 1914.

# SOCIETY PROCEEDINGS

## AMERICAN OPHTHALMOLOGICAL SOCIETY.

### Fifty-fourth Annual Meeting.

NEW LONDON, CONN., JULY 9 AND 10, 1918.

President, DR. WILLIAM H. WILDER of Chicago.

### Solid Edema of Lids and Face.

DR. WALTER BAER WEIDLER, New York City, read a paper describing this condition and reporting 3 cases with the results of treatment, which is published in full, p. 722.

DISCUSSION.—DR. S. Lewis Ziegler, Philadelphia, Pa., had published a case of a similar nature in 1911. Cellular infiltration with hemophilic extravasation had come suddenly into the lips, and along the side of the face and the nose. Later there was a similar infiltration in the conjunctiva. A partial diagnosis of sarcoma of the antrum had been made. The underlying cause was chronic constipation. He had seen the patient in a similar attack some years before. On thyroid extract and suprarenal extract, with a liberal use of cathartics, there was some improvement; but it was slow. As she had marked nasal obstruction, it was finally decided to cauterize the inferior turbinate and the septal puff. The resumption of free breathing caused prompt and complete absorption of the hemic infiltrate.

### Studies of Eyeballs Lost After Sclerocorneal Trephining.

DR. W. GORDON M. BYERS, Montreal, Canada, reported that in these cases the histologic findings explain the causes of the failure of the Elliot operation. In the first case, that of a woman aged thirty-one, a sclerocorneal trephining was done, with a complete iridectomy. No complications followed. Nine months later the patient returned, stating that the eye had become suddenly painful shortly after she had left the hospital; but that pregnancy and childbirth had prevented her return sooner. Examination showed a marked congestion.

The bleb over the opening was collapsed, the lens dislocated, and the broken conjunctival covering mixed with uveal tissue. In the area of the coloboma upwards, occupying about one-third of the space, was a small, tongue-shaped patch of corneal infiltration, with its base resting on the limbus. Enucleation was performed. The microscopic examination revealed changes that were, in an exaggerated way, those that are characteristic of healing corneal wounds, with a marked response to injury or infection on the part of the uveal tract. In contrast to the second case, the dislocation of the lens and the tearing of its capsule in this case were attributable to the sudden reduction of intraocular tension following collapse of the bleb.

The second case was that of a lady of eighty-three years, very active for her age, in whom a sclerocorneal trephining was performed with no complication except a slight difficulty in doing a partial iridectomy. The patient was perfectly comfortable until the morning of the eighth day following the procedure, when there were three short separate periods in which the patient saw light flashes, ushering in complete loss of sight. The eye became more and more irritable, with greatly heightened tension, necessitating enucleation. The specimen showed an ectatic scar, covering dome-like, the site of the trephine opening.

The point of interest in this case was the vitreous prolapse. A brief study of the specimen showed clearly what must have been the course of events leading to its occurrence. The trephining was too peripheral. During the first few days, the uveal tract was sufficiently strong to support the intraocular structures; but it gradually stretched under pressure; and finally gave way on the eighth day, with consequent rupture of the annular fibers and hyaloid membrane, dislocation of the lens, and renewed tension following vitreous prolapse. The flashes of light were not due to retinal hemorrhage, as was supposed at the time of

their occurrence, and no evidence of hemorrhage was found in any part of the specimen.

The lesson here is obvious. Especially in those advanced cases, in which accidents of this sort are prone to occur, Col. Elliot's advice in regard to placing the trephine opening in corneal tissue should be followed to the fullest extent, in order to guard against the occurrence of the changes described. On the other hand, such procedure offers the best chance of securing unadherent iris for excision.

A third case of the kind had been seen, but the enucleated globe could not be prepared and studied in time to include the results in this report. He desired that in discussion members might state how far they felt justified in operating when only a small amount of vision remains.

DISCUSSION.—Dr. F. H. Verhoeff, Boston, Mass., had examined a number of eyes that had been trephined unsuccessfully; and in the majority of them found that the trouble had been an injury to the lens. In a few cases of hemorrhagic glaucoma, the trephine hole had been closed by proliferation of tissue; but in the others, the result was due to injury of the lens, either by the instrument or capsule rupture. The small injury to the peripheral lens was unsuspected by the operator. Not until the eye was removed was it discovered. The whole trouble in these cases had been irritation by the cortical matter as it came from the lens. It makes a characteristic histologic picture; not an intense reaction, but a marked cellular exudation, associated with necrosis of the iris. In all the cases, the anterior chamber has become obliterated. The aqueous has been lost, and the space filled by this exudate of chronic inflammatory cells.

Dr. Walter L. Pyle, Philadelphia, Pa., had recently a case of an unfortunate result from sclerocorneal trephining with prolapse of the iris. He did a posterior sclerotomy, excised the cicatrix, released the iris, and extracted the lens. Since then, he had never attempted the Elliot operation, but pre-

ferred in hopeless cases a liberal posterior sclerotomy, releasing a drop of vitreous.

Dr. Edward Jackson, Denver, Colorado, had seen two unsuccessful trephinings that seemed due not to any error in the placing of the opening, but to the character of the cases. They were cases of chronic inflammatory glaucoma, that had gone on to practical blindness before operation was done. Altho there was no question about the very high tension at the time of the operation, they were essentially uveal inflammations; and pursued a course that did not seem to be materially affected by the Elliot operation. Neither of these eyes was enucleated. They finally quieted down, with renewed high tension, but without pain. The operation gave relief from pain, but did not seem to alter the course of the disease.

#### Pathologic Manifestations of Tuberculous Kerato-Iritis.

Dr. Fred Tooke, Montreal, Canada, reported the results of microscopic study of four eyeballs presenting the lesions of tuberculous kerato-iritis. The patients were women whose ages ranged from 18 to 48 years, who had suffered from chronic iritis following trauma, years before they had been affected by this disease. The diagnosis had been confirmed by use of tuberculin. Nodules were found at various points in the iris, and there was deep corneal infiltration in every case. In two of the eyes there was corneal ulcer and necrosis; and in two of them cyclitis. Some of the retinal veins were markedly dilated. Perivascular tubercule was discovered in one. There were numerous new-formed vessels in the cornea.

DISCUSSION.—Dr. F. H. Verhoeff, Boston, Mass.: I should congratulate Dr. Tooke for availing himself of the opportunity to examine these cases. There have been few cases of this type examined, altho many eyes must have been removed.

Experimental tuberculosis has no bearing on ocular tuberculosis as we



see it in man. Normal rabbits with virulent bacilli injected into their blood have small metastatic foci, marked in the iris. In the human being who has had tuberculosis for a long time, the metastasis does not overwhelm with tubercle bacilli.

My work was based on the supposition, indicated by microscopic examination, that lesions of tuberculosis in man are due to the bacilli which get into the aqueous humor; and, from there, are deposited in different parts of the eye; and that they are not due simply to tuberculous emboli in various vessels of the eye. Lesions are due to the bacilli being deposited from the aqueous in various places, notably in the infiltration angle and on the surface of the iris. The picture is very different from that in blood metastasis, as we ordinarily understand it, and that which Stock got. It is impossible to reproduce in animals the condition found in man. The nearest that I could get was to inject dead bacilli; which do not reproduce themselves, or cause the active lesions produced by the living ones.

Recently it has been shown that the retinal hemorrhage of young subjects is due to tuberculosis. Fleischer concluded that it was due to bacilli, not coming from the blood current directly, but getting into the retina from the anterior part of the eye, and being carried along the perivascular channels. If that is so, it would be in line with tuberculous sclero-keratitis and iritis. I have a number of cases of this type of tuberculosis, associated with tuberculous iritis and keratitis.

Dr. John E. Weeks, New York City: I should like to call the attention of the gentlemen to the rather strong resemblance of certain cases of so-called disciform keratitis to tuberculous lesions of the cornea. Dr. Tooke tells us that on the posterior surface of the cornea there is either a multiplication of the endothelial cells or a collection of lymphocytes, or both, giving the appearance of deep-seated punctate keratitis. Now in the two or three examinations of corneas with disciform

keratitis, the pathologic findings have been those of small cell infiltration, with a caseous degeneration or necrosis of the corneal lamellae, and in parts a disturbance of the epithelium.

Those who have studied this form of keratitis at its inception, find that the proliferation takes place in the superficial lamellae immediately beneath Bowman's membrane. The epithelium extends downward; and after a time, we have a whitish necrotic area, with spots in the parenchyma of the cornea, and in some cases, a collection on the posterior surface of the cornea. These collections microscopically consist of deposits such as those that Dr. Tooke has mentioned.

Dr. Tyson, in 1915, advanced the opinion that these conditions were tuberculous; and I recently made a clinical study of some cases, from which I also formed the opinion that they were tuberculous. I should like to call attention to this supposed tuberculous origin of exogenous infection. The insensitiveness of the cornea in these cases is due to the absorption of toxins and their effect on the terminal filaments of the fifth nerve.

#### Cataract in Retinitis Pigmentosa.

DR. ARNOLD KNAPP, New York City, pointed out that a practically constant complication of retinitis pigmentosa in the later stages is a cataract of the posterior layers of the lens. This has usually not been considered amenable to treatment, on account of the severity of the fundamental disease. Doyne, however, was struck by the remarkable improvement in sight which followed the removal of the lens in these cases. Knapp reported four cases operated on with good visual results, vision being improved from 20/200 or less to 20/50 and 20/70, and from 3/200 to 15/200. The operation done was the ordinary cataract extraction, two of them having been extracted in the capsule. In each case the Wassermann had been negative. There was no complication in the recovery after extraction of this form of cataract; and the results had been so favorable that he felt the operation should be urged

upon the attention of ophthalmologists. There had been no improvement in the visual fields.

DISCUSSION.—Dr. Herbert Harlan, Baltimore, Md., reported a case operated on about twenty years ago. The patient had long known that he had retinitis pigmentosa. He had consulted several oculists, and they all told him that he would eventually go blind, and that nothing could be done for him. His vision had become very bad. In walking on the street in the light, he could not see anything, such as a hole in the pavement. He had been training himself for blindness for years, so carefully that he was able to keep his position in the Pension Department through various administrations. There seemed to be no reason why the central cataract should not be removed, since it was shutting out the only vision he had. There was no difficulty about the operation. When glasses were adjusted, he had nearly 20/20 vision. He said that he had never before been able to see from the inside of the house the rain falling on the outside. A month afterwards, he came for an operation on the other eye. The operation was satisfactory; and the man was living last year, still retaining his central vision.

Dr. William H. Wilmer, Washington, D. C., had recently seen Dr. Harlan's patient, who is still living and holding his clerical position. His experience in these operations tallies exactly with Dr. Knapp's. It is a very successful operation. One gets the power to put on a strong convex lens and get magnification. People who would otherwise have to give up their vocations in life are thus able to continue their work. He had a number of these patients who were following their vocations in this way, when they would otherwise be on the shelf.

Dr. Harlan's patient had consulted him a number of times during the last few years. There is a slight capsule there, but so slight it would not be advisable to do dissection. The man has epilepsy and all sorts of physical disabilities, but he has a bright mind. His

son leads him to the office every morning, and he works all day. He wears cylinder 3. D., and his spherical for reading has been gradually increased until it is now 20. D. He gets his nose very close to the paper, and continues his clerical work. He has for night reading a frame devised by Dr. Koller, with a rubber arrangement and a lens at the end. By getting close, he can read the paper. He has still, with his great physical disabilities, a central vision of 20/100. Certainly this operation has been quite as successful as any other operation in a similar complicated condition.

#### Microscopic Findings in Coralliform Cataract.

DR. F. H. VERHEOFF, Boston, Mass., pointed out that no case of coralliform cataract has hitherto been examined microscopically. The examination of the present case showed the characteristic opacities to be due to the presence of large crystals in the lens. These crystals did not consist of cholesterin, as has been assumed, but of lens protein. Coralliform cataract is not identical with spindle or axial cataract. Its possible relation to lamellar cataract and rickets was discussed and an explanation of lamellar cataract suggested as due to deposits in the lens due to defective metabolism with regard to calcium compounds. It might be that the opacity resulted from the undue persistence of lipid particles, normally present in the fetal lens, the absorption of which left the vacuoles.

*(To be continued)*

#### SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

April 18, 1918.

DR. S. LEWIS ZIEGLER, Acting Chairman.

#### Buphthalmos.

DR. LUTHER C. PETER reported the case of an Italian child, five months old, first seen when one week old, when the conditions were about the same as now.



Both corneas were large, 15 mm. in diameter, bluish in color, with central opacities. The sclera was bluish in color and as a rule free from redness. The anterior chamber was very deep, as the mother said, "the pupil was too far back." The pupils were large even when under the effect of eserine. The iris was normal in appearance, and fundus details were not obtainable. Tension was increased. The child had good light perception and apparently good projection.

In the family history it was interesting to note that one brother, now six years old, had a similar condition at birth. The left eye was removed when one year old, and the right now is sightless and in an irritable state, although not painful. There is a distant relationship between the parents—cousins three times removed.

Although the mother's Wassermann was negative, the treatment had consisted in mercurial inunctions and a weak yellow oxid salve and eserine locally. The corneas are now clearer than after birth and the eyes are less sensitive to light.

#### **Probable Intraocular Tuberculosis.**

DR. PETER detailed the history of a case of intraocular growth.

Catharine G., aged eight and a half years, the fourth of five children. Had measles one year ago, otherwise was a healthy child. Five weeks ago the mother accidentally discovered that the child was blind in the right eye. Never complained of pain. Admitted to the Samaritan Hospital a few weeks ago. Examination showed normal pupillary responses and the external appearance of the eye was normal. When the pupil was dilated, however, by oblique illumination, a grayish-white mass was found midway between the lens and the posterior pole of the eye down and to the outer side. Projecting out and to the nasal side was a thin semitransparent exudate in the vitreous body. This prolongation was fan-shaped and had the appearance of a cactus-like growth. There were numerous fine opacities of the vitreous and a red reflex was obtainable up and to the nasal side.

The child apparently did not recognize even hand movements at any distance. Transillumination was fairly good through this opaque mass. Blood-vessels were not visible at any time. No fundus details were obtainable by means of the ophthalmoscope. The Wassermann was negative and the general physical examination showed a practically normal child. The tuberculin test was slightly positive, but not decidedly so. There was a slight tendency to a rise in the temperature after the injection of one ten-thousandth, one five-thousandth and one two-thousandth of a milligram of T. R. Mulford No. 1. She received hot packs daily but there was apparently no improvement until after the administration of tuberculin. During the last two weeks, a fundus glare has been visible over a larger area and the child now sees hand movements at 2 feet and occasionally a retinal vessel can be dimly outlined.

The diagnosis has been in doubt. The age of the patient, the appearance of the growth, the absence of the vessels, and the apparent improvement have practically eliminated glioma as an etiologic factor. The slight positive tuberculin reaction and the apparent improvement since tuberculin has been administered have tended to confirm Dr. Peter's suspicions of the tubercular character of this condition. Retinal detachment and cysticercus can be excluded.

DISCUSSION.—Dr. Zentmayer said that he had had the opportunity of seeing the case thru the courtesy of Dr. Peter when it first came under Dr. Peter's care. The age of the patient, the minus tension, the absence of a tumor mass and the history that it followed an attack of measles made him suspect that it was a case of detachment of the retina of the class first described by Nettleship or that it was one of tuberculosis.

Dr. Hansell said the morbid process now apparent in the vitreous bore no resemblance to either glioma or pseudoglioma, altho when it was in the formation stage those two affections were worthy of consideration in deter-



mining the diagnosis. The latter has been reported as a sequel of the exanthematous fevers. When present it leads to rapid destruction of the intra-ocular tissue. Here there was a most unusual, probably fibrous formation in the vitreous, the origin of which was difficult to determine.

### **Growth from Ciliary Body After Cataract Extraction.**

Dr. G. Oram Ring reported the case of Mrs. R., aged fifty-four years, who was operated upon seven years ago for cataract. A combined extraction, with later secondary incision of the capsule was the procedure adopted.

She presented herself on July 11, 1916, and the cataract in L. was extracted by one of Dr. Ring's colleagues.

During visits for the examination and treatment of L. there was noted a minute growth lying on the opaque capsule of the right eye, apparently proceeding from the ciliary body out and down and pressing the iris forward slightly. The color was a grayish yellow with a more definite yellow point above. The growth continued slightly for nearly two months, but the eyeball remained white and comfortable. Corrected vision is 20/30.

The case was shown because here again there was some difference of opinion as to the procedure indicated. The writer declined to advise enucleation, and upon watching the eye for the last three months no change could be recognized in its appearance.

The question of diagnosis involved a decision as to the malignant character of the growth. The writer inclined to its nonmalignancy.

### **Unusual Case of Glaucoma.**

DR. LUTHER C. PETER gave the history of the following case: R. L., aged thirty-five years, single; a mulatto, suddenly developed pain and redness of the right eye June 28, 1912. He was treated in the South from June to December for iritis. The history of this early attack was quite vague, but apparently atropin was used continuously from June to December, after which eserine was employed. Prior to the on-

set of the trouble, during the winter of 1911, the patient suffered from rheumatism. She came to the Polyclinic Hospital August, 1913. At that time she was suffering from an absolute glaucoma of the right eye and there was considerable cupping of the left disc, altho the fields were practically normal. A broad iridectomy was performed on both eyes. As the right eye continued to be painful, one year later, a sclerocorneal trephining was performed on the right eye by the late Dr. Wendell Reber. Since then the right eye has remained quiet and has been entirely painless. The patient had at times, previous to the iridectomy of the left eye, some vague pains but never knew that her left eye was involved.

The condition at present is as follows: Tension varies from 20 to 25 mm. Hg. There is no pain, and no pericorneal redness. The fields are interesting because they show a typical Bjerrum sign, namely, a large reentering angle which extends to and includes the enlarged blind spot of Mariotte. The field has remained stationary during the past year and a half. The ophthalmoscopic examination shows typical glaucomatous cupping which includes a good part of the disc and extends to the margin of the disc on the temporal side. Vision 20/20.

The points of interest in the case were:

1. The early history, which was very vague, but because of the bilateral character of the glaucoma, it was more than likely that the right eye began as a glaucoma.

2. The early age of onset. The patient was about thirty years of age when she first noticed the loss of vision. It is more than likely, therefore, that the first evidence of disease dates back considerably further. Just at what age the trouble began is difficult to say. It must, however, have been considerably under thirty years of age.

3. The Bjerrum sign. This sign, Dr. Peter thought, was present in a great many more patients than is usually supposed.

4. The value of the broad iridectomy was here emphasized. He performed the iridectomy August 5, 1913, almost five years ago, and the patient had lost since then very little of her visual field.

#### **Regeneration of a Cornea Partially Lost During Gonorrheal Ophthalmia.**

DR. J. MILTON GRISCOM gave the details of a case of severe corneal ulceration secondary to an attack of gonorrheal ophthalmia. The ulcer involved the entire cornea with the exception of a zone about 2 mm. wide at the upper limbus, and penetrated as far as Descemet's membrane at one point in the lower half of the ulcerated area, but did not perforate it. The ulcer eventually began to heal and the cornea to regenerate from the uninvolved strip at the upper limbus. Instillations of eserine, alum and adrenalin (1-1000) were used during the process of repair. At the time of the report six weeks after the beginning of ophthalmia, the upper third of the cornea was entirely clear, the middle third showed a faint superficial haze, and the lower third was somewhat more opaque. The patient was conscious of increasing clearness day by day, his vision being 14/200. Dr. Griscom thought the case to be one of true regeneration of the corneal stroma following ulceration.

**Discussion.**—Dr. Zentmayer thought the repair of the cornea in this case had been very remarkable. He saw the case repeatedly during its stay in the Wills Hospital and at one time, while the conjunctival inflammation was still very intense the destruction over a large part of the cornea seemed to extend down to Descemet's membrane. He was sure, had the case been his, there would not have been a case of regeneration of the cornea to show.

Dr. Hansell said the use of adrenalin in the treatment of corneal ulcers was practised extensively by the late Prof. Stanculeanu, altho it was not sure that he claimed originality in this method.

During Dr. Hansell's stay in Bucharest, in the summer of 1914, he ob-

served a number of cases, both traumatic and secondary, purulent and non-purulent, in which the only treatment, other than cleansing, was adrenalin 1-1000 dropped into the eye every two hours. The efficacy of this drug was demonstrated in about one-half of the cases.

#### **Unusual Case of Steel Injury.**

Dr. William M. Sweet exhibited an unusual case of steel injury. The metal, 4x2 mm., passed thru the lower lid at the inner portion, 1 cm. from the margin, and was located by the X-rays to the temporal side of the orbit, below and back of the eyeball. From the history of the injury the steel must have passed in a slightly upward direction thru the eyelid, probably wounding the eyeball at its lowest portion, and then was deflected downward to the situation indicated by the radiographs. Vision was not affected for several hours after the accident, and at examination equalled good light projection. Only a grayish reflex was seen by the ophthalmoscope.

#### **Gunshot Wound of the Eye.**

DR. HOWARD F. HANSELL reported the following case: William H., aged nine years, while at play with boy friends on February 12, 1918, was struck in the left eye with a small B. B. bullet from an air gun. General family history, personal history and general physical examination negative. Upon admission a few hours following the accident the anterior chamber was filled with blood, the eye intensely injected but no rupture of external tunics was apparent. The usual local treatment was ordered and an X-ray immediately taken which was negative. As the blood in the anterior chamber absorbed, it was found that an iridodialysis was present down and in with traumatic cataract, the capsule having ruptured and the swollen lens had partly filled the chamber especially at the upper two-thirds.

The pupillary fibers of the iris at the lower edge were ruptured and the iris adherent to lens capsule despite the active use of atropin.

The muddy appearance of the iris, a somewhat cloudy anterior chamber, swelling of lens, tendency to rise of tension, intense watering and dread of light with some lachrimation and photophobia in the fellow eye led to a divergence of view as to the best procedure to be adopted.

During a temporary absence of the writer for a few days the atropin was continued beyond the proper point and the cornea became steamy with definite

rise of tension notwithstanding considerable absorption of swollen lens matter. Eserin was at once ordered, followed by a clearing of the cornea and the marked amelioration of all symptoms in each eye. As light perception and projection are now definitely present it was felt that the operation upon the remaining capsule was likely to result in a saved and probably useful eye.

J. MILTON GRISCOM, M. D.,  
Clerk.

## ABSTRACTS

Papers that require early attention are here noticed. The systematic review of all current literature is to be found in the Digest of the Literature.

**V. Morax.—Clinical Notes on Some Atypical Signs of Subacute Glaucoma.**—*Annales d'Oculistique*, February, 1918.

It is a well known fact that acute glaucoma can occur unrecognized for some time, the reflex symptoms which generally accompany it, cephalalgia, vomiting, malaise, etc., obscuring the eye trouble. This also occurs with subacute glaucoma, which may remain undetected, even by the ophthalmologist, for months and years, if the intra-ocular tension is not carefully ascertained.

Morax emphasizes the importance of recognizing the early symptoms of glaucoma, and describes some atypical forms of the subacute variety, beginning with uncommon symptoms. The classical signs, such as colored rings around artificial lights, foggy vision, supraorbital or temporo-occipital pain, dilatation of the pupil, disturbances of the accommodation, etc., are well known, and even dramatic literature has vulgarized them in France. But on the other side, there are some uncommon initial signs which it is necessary to detect as soon as possible in order to arrive at a correct diagnosis.

Morax describes two new ones: *orbito-facial* pain, simulating a deep bony pain, similar to that found in sinusitis and periostitis, and *lachrimation*. He relates the history of two patients afflicted with the former symptom.

The first was a strong and well built man, 43 years old, complaining of headaches for 15 months previously. The trouble being attributed to stomach complaint, he was submitted to severe diet, but without any avail.

After one year the pain, intermittent at first, became continuous, and localized specially around the orbit. No lesion of the sinuses being detected and the Wassermann being negative, he was referred to the ophthalmologist. A careful examination of the eyes failed to detect any pathologic changes. Fundi were normal and visual acuity normal in both eyes. A neuropathic condition was diagnosed and the patient was going to be discharged, when Morax tried the tonometer, and to his surprise he found 60 mm. of tension in one eye and 45 in the other. It was then a true glaucoma developed without any ocular symptoms, vision remaining good all the time. Pilocarpin was used and the pain immediately subsided, confirming the true nature of the disease. Tension lowered to 28 and 23 mm.

The second patient was a woman 46 years old, who some months before had dimness of vision, to which however she did not pay any attention. She suffered a great deal from facial and orbital pains without any known cause. A tooth was extracted and the sinuses were examined. Referred to the ophthalmologist vision was found normal



in both eyes; visual fields normal; emmetropia, pupils reacted as usual, fundus normal. Tonometric examination revealed the cause of the trouble. R. T = 42 mm. Hg. L. T. = 22 mm. Pilocarpin instilled four times a day lowered immediately the orbito-facial pain; and after some days tension was R., 30 mm. and L., 24 mm. The effect of the drug decreased a good deal after two months of treatment and sclerectomy-iridectomy was advised.

Of the other new symptom, lacrimation, he describes two cases. A man 50 years old, stalwart and well looking, sought advice for lacrimation which had lasted for two years, and came on from exposure to fresh air; but sometimes also indoors and when going to sleep. There was no visual trouble, no pain. Myopia of  $-1.25$  and  $-1.75$  was found. Correction gave normal acuity. Visual fields normal. Ophthalmoscopic examination detected slight cupping of the disc, not easily referable to hypertension. Lacrimal passages had only a stricture of the puncta, which after proper dilatation allowed an injection to pass freely into the nose without any reflux.

Intraocular tension, which to palpation seemed normal, showed with the tonometer: R. = 45 mm., and L. = 42 mm. Pilocarpin relieved entirely the hypertension, the tonometric readings descending to 28 and 26. Lacrimation disappeared when the tension lowered.

In another case an old woman complained of watering eyes, the trouble being as marked indoors as outdoors. But examination of the lacrimal passages failed to detect any abnormality. Inverse astigmatism in both eyes suggested the examination of the tension, which was found increased to 36 mm. in both eyes. Papillae slightly excavated. Vision 8/10 in both eyes. Pilocarpin relieved entirely the lacrimation.

These two symptoms may of course be found in cases of advanced glaucoma, but in that stage they have less diagnostic value.

M. U. T.

**Suganuma. Pathologic Changes in the Choroidal Hyaloid Membrane and Retinal Pigment Epithelium.** Nippon Gank. Zasshi, August, 1917.

With this a long article comes to its conclusion, but it cannot be abstracted in full. The author says with Wolfrum that the choroidal membrane consists of two lamellae, the lamina basalis and lamina elastica. The first is the basal membrane of the retinal pigment epithelium, and the second consists of a net work of elastic fibers of the choriocapillary layer. The plasma of the blood, which circulates in the intercapillary layer of the choroid, diffuses thru the lamellae into the outer retinal layer. Thus the latter and the pigment layer are nourished.

A narrow space exists between the lamella, which in the ciliary region contain fibrils, and there is commonly found here some pigment epithelium. In examination of 11 globes, he found in only one that more elastic fibers went to the optic nerve. The author is of the opinion that the relative retraction of the lamina elastica arose from a pull between the retina and the choroid from the optic nerve by the nerve fibers. This is also Heine's idea.

The pigment epithelium and lamina basalis are first destroyed in glioma, and then the lamina elastica is attacked; whereby the meshes of the network become larger and the tumor cells grow between, because of which the lamina becomes defective. Also a form of ulceration occurs during the choroidal tumor growth, the lamina gives way over a considerable area and becomes torn thru the stretching; therefore, bleeding may be observed. These spots become organized and shrink, following which the tumor often becomes constricted at its neck and secondary necrosis of its apex appears.

From the examination of many eyes of different types, the author has the opinion that the lamellae of the choroid is a limiting membrane, and acts as a protection against force. When the lamina basalis becomes changed in the pigment epithelium, the outer lay-

ers of the retina are damaged. But damage to the lamina elastica is more grave, for thereby the choroid capillary layer is destroyed; and this brings with it severe damage to the outer retinal layer.

The author has examined the pigment epithelial cells in many cases of various diseases, and has made some clinical experiments. As a rule, the pigment defect is connected with increase of pigment especially in the periphery. The retinal pigment changes arise from, 1st, direct penetration of pigment epithelial cells; 2nd, thru secondary proliferation from the choroidal wandering pigment epithelial cells; 3rd, thru transportation of the epithelial cells and free fuscine bodies thru the leucocytes and the lymph stream in the spaces between the vessels of the retina; 4th, taking up of the freed fuscine bodies thru the adventitia of the vessels and the glial tissues.

The author has also found that sclerosis occurs in glioma of the retina, and in leprosy inflammation of the retinal vessels; which are first seen in the enlarged pigment epithelial cells. The author thinks concerning this that pigment degeneration of the retina is first a sclerosis of the vessels thru investment, by which the secondarily enlarged pigment cells become more sclerosed. True pigment from all sources is noted in the pigmented sarcoma of the choroid. In this the large round cells, according to Leber arise from the enlargement of the pigment epithelial cells; but the author has never found such a condition and therefore cannot corroborate Leber's statement. The glands seem to be composed of pigment epithelial cells in which the hematomolysin becomes bluish, and which thru contraction, are surrounded by larger granular formations.

KOMOTO and H. V. W.

**Steiger, A. Accidental Light on Myopia.** *Ann. d'Ocul.*, Vol. 155, p. 54.

Steiger, at the Ninth Annual Meeting of the Society of Swiss Oculists, expressed his opinion that emmetropia is not the normal refraction. In-

fants vary as to their refraction, and refraction itself varies with development, occupation and instruction. Lesions of the fundus exert an influence not well understood upon the refraction. Heredity plays its part, as well in hyperopia, astigmatism and emmetropia as in myopia. Myopia is not only a pathologic condition; it is also a biologic. States of refraction are probably established according to the three following laws:

(1) Biologic characters have not a distinct form and extent, but vary according to certain laws. (2) These variations have a greater or less tendency to progress, but are held in a certain average by selection and elimination. (3) This selection, this elimination, these variations are not present in the individual, but in a series of generations; they are phenomena of phylogenesis, not ontogenesis.

In the course of generations, the variability of refraction may increase this selection, may lessen or may cease entirely, and the eye may lose its functional perfection, and in certain families may go on to degeneration.

C. L.

**J. Santos Fernandez.—How Should the Ophthalmic Surgeon Act with the Hopeless Cases.**—*Cronica Medico-Quirurgica de la Habana*, April, 1918.

This subject has been well discussed at the XI International Congress of Ophthalmology held at Naples, Italy, on April, 1903, and before that date by Javal, who had lost an eye. Afterwards Von Zilly and Eliaberg had discussed the subject. The author believes that one has to take in consideration the age and social condition of the patient, and although it is always good to have these incurable patients prepared to know their fate, one should be very careful and have pity on the sentiments of the unfortunate beings. If the patient is rich, the family should be told his true condition, but he himself should not be told, as not having to work, he can be kept piously fooled. But in cases of workers, the truth should be told, altho with some precautions.

F. M. FERNANDEZ.

# American Journal of Ophthalmology

Series 3, Vol. 1, No. 10

October, 1918

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

## THE OPHTHALMIC ASPECTS OF THE MEDICAL AND SUR- GICAL HISTORY OF THE WAR.

The six large and profusely illustrated volumes furnishing our Medical History of the Civil War were published twenty-six years after peace was declared. In spite of the voluminous character of the publication little or nothing is said in it about eye surgery. Quite different will be the case, it is believed, with the Medical History now in preparation to record American participation in the present war. Before 1862-1865, ophthalmology was almost a negligible factor in military medicine; since then it has acquired an important place and will be given corresponding attention by the historiographer of the conflict now going on. It is the hope of the Division of the Surgeon General's Office in Washington, charged with the duty of collecting and preparing the material for this History, that within not more than five years after the war is ended a mono-

graph will be printed and distributed that will, because of its early publication, add materially to its teaching value without detracting from its purely historical significance.

Already a complete account of the activities (to date) of those ophthalmic surgeons in service at home and overseas has been prepared for the Surgeon General by the Division of Head Surgery and a continuation of the record will be maintained, as indicated in the following brief account furnished by Lieut. Colonel Garrison.

The medicohistorical division of the Surgeon General's Office was organized by Special Order A. G. O. No. 196 in August, 1917, and has been occupied to date mainly in collecting the raw materials for the ultimate composition of this history and in devising ways and means for carrying out the plans of the same. After correspondence with Sir Walter Fletcher, Sir William Osler and others in England, it was decided to start at the point at which the English authorities had arrived, after a careful consideration of three years'



material, viz., to project a series of volumes in which the different themes are treated as well as considered, exhaustive monographs individualized by the actual authorship of those whose knowledge and experience in the different subjects are most authoritative.

In accordance with this plan, the following has been accomplished:

The interim reports and protocols by medical officers of the U. S. Army on duty as observers in England and France have been collected from the War College and the Council of National Defense; and a catalogue, giving brief abstracts of their contents, has been mimeographed and circulated.

Memoranda to medical officers in the field, requesting that they collect material for this history, have been printed and circulated.

Every effort has been made to collect the individual histories of the administrative divisions in the Surgeon General's Office, of the camps and of the base hospitals in the United States. Most of this material is now on hand.

Steps have been taken to secure continuity in these histories by means of annual historical reports (for administrative divisions); and by medical war diaries (for camps and base hospitals).

Thru a circular issued by the Hospital Division, the commanding officers of base hospitals have been authorized to direct preparation of subject indices of medical and surgical cases, with the tacit understanding that these become available for the use of the Historical Division at the end of the war; and to send in, as manuscripts or as reprints (either for record or publication), accounts of epidemics, group diseases or unusual medical and surgical cases occurring in the hospital, as part of this history. In this way much of the historical material will be actually assembled during the war; and the delays occasioned by the priority of pension claims will be to some extent obviated. In England, this plan is actually in process of realization, thru the publications of the Medical Research Committee (London).

A tabular statement, concerning the movement of preventable diseases, has

been made by this board each week since September, 1917. These tables, based on the weekly telegraphic reports made to the Division of Sanitation, concerning thirty-one separate cantonments, will be a first instalment of the history of mobilization in its first year (September, 1917, to September, 1918), and should be available before the end of October, 1918.

Arrangements have been made to take care of the historical material relating to American participation on the western front, already accumulated in France, and for the accumulation of similar material in Italy (southern front).

Friendly relations have been established with the military authorities controlling the medical history of the war in Great Britain, France and Italy.

An advisory council, consisting of Col. Victor C. Vaughan, Col. William H. Welch and Col. William Mayo has been appointed to assist this board in passing upon applications for commission or employment, expansion of the board and other matters under advisement. Lt. Col. Casey Wood has been assigned Acting Director and placed in charge of the Division during the absence of the Director, Col. Champe C. McCulloch, Jr., now in Europe and engaged in overseas duties.

As a part of his duties the Acting Director has published (*Military Surgeon*, May, 1918) a short description of "A Few Civil War Hospitals" and later (*Ibid*, Sept., 1918) a "History of the Base Hospital at Camp Sherman."

CASEY A. WOOD.

### **"OPHTHALMIC OBSERVATIONS AND PROGRESS DURING THE GREAT WAR."**

Already we have the results of ophthalmic work from the war reduced not only to the form of articles; but in the case of some of our confreres to whom has been given this magnificent opportunity for observation, we now have had donated to the advancement of ophthalmology, a number of books, in which the knowledge of the effects of wounds and injuries of the eye has

been markedly increased. Indeed we expect a plethora on this subject, for so many of our experts who are likewise adept with the pen, no doubt hold it as their ambition to write a book upon some aspect of their experiences.

The great Frenchman Lagrange, has now put forth two books, the one, his "Ophthalmoscopic Atlas of the War," the other his "Fractures of the Orbit." The first reviewed by our managing editor, on page 611 in our August number, the other by the writer in this issue.

In the August, and in the current number will be found the very complete essay by Lt. Col. Elliot of London on Quinin Poisoning, Its Ocular Lesions and Visual Disturbances, in which a well needed warning as to the excessive use of this medicament is given.

In these days of strenuous activity, when the nations are pushing their mechanical output of everything that can be of use to the armies and thus aiding in the rapid establishment of democratized civilization thruout the benighted countries of Europe, as well as at home, we have many men taken from trades and professions without mechanical training, and put in those in which brawn is a factor and in which they have not been educated to tools and machinery; this more or less unskilled labor has accidents comparable to those which are the results of gunshots.

Thus it is that at this time the publication of this form of literature is not only a benefit to the surgeon who is at war, and his patients the soldiers; but to the oculist who takes care of those industrial soldiers, who are at dangerous trades, necessitated by our enormous commerce and the feeding and supplying of our armies.

We may look forward to other books on the same subject, to other books upon hygiene, upon the army diseases of the eyes, upon the subject of hemeralopia and upon the relation of the eyesight to occupations, written by our confreres who have this undisputed opportunity to observe masses of apparently healthy men under unusual and

strange surroundings. These observations will later be of great value in times of peace as they are now in times of conflict.

H. V. W.

### BOOK NOTICES.

**The Indian Operation of Couching for Cataract**, Incorporating The Hunterian Lectures, by **Robert Henry Elliot**, M. D., B. S., London, Sc. D. Edin., F. R. C. S., Lieut.-Col. I. M. S. (Retired). With 45 illustrations. Paul B. Hoeber, '67 and 69 East Fifty-ninth street, New York City. 1918. Price \$3.50.

Very few American ophthalmic surgeons have seen cases in which the lens has been couched for cataract. Indeed dislocations of the lens into the vitreous, be they operative, traumatic or incidental to disease, are extremely rare in ordinary private practice.

In India, however, the conditions are different, owing to the pernicious activities of the "rawals" or "vaidyans," the itinerant Indian charlatans who practice their nefarious trade at times, being otherwise farmers, fishermen or even beggars. As with the charlatans of the white races, they travel from place to place, not waiting for the end results, but moving along before vengeance overtakes them. The craft of couching in India is hereditary, the principles being handed from father to son by word of mouth, or by practical instruction.

These Indian couchers do both the anterior and the posterior operations, one thru the cornea and the other thru the sclera. They do both depression and reclinacion. Their filthy tools, habits and the practice of putting on fowl's blood or other septic alleged medicaments leads in many cases to panophthalmitis; and as Lt. Col. Henry Smith says, "even the best cases if followed long enough end in absolute blindness."

The author reports 780 cases. No table is more interesting than that which gives the state of vision when the patients came under observation. In only 10.59 per cent was the vision  $1/3$  and upward. In another, 11.05 per



cent the vision was  $1/4$  to  $1/10$ , in 9.64 per cent it was  $1/10$  to  $1/50$ , and in 7.05 per cent it was a finger-count at 2 feet or less. The figures given refer in each case to the vision corrected with lenses. If every case that got a vision of  $1/10$  and upward be considered a success, the coucher can claim 21.64 per cent. Again, if anything from  $1/10$  vision to the ability to count fingers close to the face be counted as partial success, the figure for this class is 16.69 per cent. This is very much more liberal treatment than would be accorded to the cataract statistics of any modern surgeon.

A further light is thrown upon the above figures by a study of the table showing the duration of vision after couching. Of the 45 successful cases, 23 of them, or more than 50 per cent, had been couched less than two years before; 9 more had been couched between two and three years, and 11 from three to ten years. In two, this detail was unmarked. The great preponderance of short histories in the cases of successful operation is significant.

Chapter 5 and following is from the Hunterian Lectures delivered before the Royal College of Surgeons of England on February 19th and 21st, 1917, giving description of 54 globes and many photographic illustrations of these sections, made by Mrs. Elliot. The author had the assistance of a number of eminent surgeons and helpers in the collection of material and the preparation of specimens.

The book also contains a number of reproductions of pictures from ancient authors. It is very interesting reading and especially valuable in regard to the pathologic anatomy. This is a kind of work that could only be written by a man of rich experience, and certainly can hardly be added to or reproduced for a long time. H. V. W.

**Les Fractures de l'Orbite par Projectiles de Guerre.** Félix Lagrange, Professor à la Faculté de Médecine de Bordeaux. 8vo, pp. 222, 77 figures in the text and 6 plates. Paris,

Masson et Cie, 120, Boulevard Saint-Germain. 1917. Price 4 francs.

This is a paper covered volume of 222 pages, one of the compendiums of medicine and surgery of the war, of which 16 have been published, 2 are in press and 3 in preparation, all having to do with the medical treatment or surgery of the war.

These treatises are of present actual value, altho they will be subject to changes and improvements after the war, when the work of the ambulance corps, the hospital and the laboratories will be of avail. These memoirs are now of great practical importance and of particular interest to the general surgeon as well as the ophthalmologist, as is the present volume on Fractures of the Orbit, dealing as it does not only with the actual fractures, destructions and displacements of the bony and soft parts, but with the effects of these injuries upon the eye.

This is a living book. It was not written in a library but mostly in the hospital with the collaboration of the author's assistants; having the opportunity of observing the vast number of 609 such cases out of 2,554 war injuries, showing a very large preponderance of orbital fractures. Of these head cases, 397 i. e. 65 per cent were healed with conservation of the globe; 212, 34.5 per cent with its destruction; 105 or 17.2 per cent did not have any ocular lesion, whereas 292 or 47.9 per cent, the eye was injured or destroyed.

The book has a short chapter of history and another on the anatomy and surgical physiology, and not only takes up the fractures of the bones and the injuries to the soft parts, but deals with all the injuries of the eye and the vision, that may come from the effects of shot wounds.

His conclusions give a fair idea of the contents and are herewith shortly abstracted.

First.—Attention is called to the fact that the fractures of the cranium by projectiles from firearms do not show irradiation, nor do they show fracture by contracoup, contrary to many met with in civil life, where the sphenoidal fissure, the optic canal and



the structures contained therein may be indirectly affected. Fractures of the orbital vault in army surgery are always found to be direct.

Second.—The eye is often implicated, not only by direct injury but by concussion of the tissues; showing lesions visible with the ophthalmoscope in the form of hemorrhagic injuries of the choroid and retina. In some cases where sight is affected, no ophthalmoscopic signs may be present, due to a commotion of the retina.

Third.—Projectiles may pass by the eye without directly injuring it and yet a fragment of the bone may contuse the globe.

Fourth.—There are certain well defined laws which have been determined as the result of the examination of these cases which show with exactitude the kind of injury that has been produced by certain forces.

Fifth.—When the choroid and retina are torn, the resultant intraocular hemorrhage does not produce the classical retinitis proliferans, but a chorioretinitis of a typical form. The total cutting of the optic nerve, which is often seen in war but is unusual in civil practice, produces this proliferating chorioretinitis of a maximum type.

Sixth.—There is a marked absence of partial scleral ruptures produced by depression of the equator. The projectiles striking the eye tangentially make contact lesions. They contuse the eye directly, others destroy it. There is no place in military ophthalmology for scleral ruptures at the ciliary region, and subconjunctival luxations of the lens. They do not exist.

Seventh.—Hematoma of the optic nerve is not carried into the ocular cavity. Recent hematoma therein is secondary, due to slow migration of the pigment.

Eighth.—This work treats of the surgical repair of the orbit, especially with fatty and cartilaginous grafts, the latter a decidedly new procedure and of pronounced importance. Two points strike one, the use of "colmatage," which consists of dissection of the conjunctiva over the ciliary region between the insertion

of the recti muscles, and cauterization of all of the region of the Schlemm's canal, for detachment of the retina. This procedure obliterates the lymphatic canals and results in all sorts of experimental glaucoma and in three cases, out of 135, has resulted in complete cure. In 8 others, an amelioration. The other point was the question of sympathetic ophthalmia which the author considers very rare, having observed but five cases out of 2,554 ocular globe injuries. Early enucleation is its preventive. H. V. W.

**Headaches and Eye Disorders of Nasal Origin**, by Greenfield Sluder, M. D. With 115- Illustrations. St. Louis. C. V. Mosby Company. 1918.

Most of the cases of recurrent headaches that the ophthalmologist sees are due to eye strain, those of the internist to toxemias, those of the syphilographer to syphilis, and quite a proportion of those of the neurologist to simple nerve strain. Now we find that a certain class of headaches, even those that may be produced by the use of the eyes, are ascribed to disease of the sphenoidal or ethmoidal sinus, and are only to be relieved by giving free drainage and ventilation by treatment or operation.

It must be remembered, however, that headache *per se*, is only a symptom, and that various causes may be acting at the same time. The removal of all or even of only one factor may relieve the symptom; and to the therapeutic measure used at the time may be ascribed the cure, and to the part involved, the cause.

In these days of highly specialized specialists, such is indeed the tendency. The true physician, be he specialist or a general supervisor of health, must remember the complexity of the causes of headaches, and the complicity of this symptom in a very large proportion of ills to which humanity is heir.

*Retournos a nos moutons*; Sluder and his collaborator, John Wright, illustrate very well the involvement of the superior accessory sinuses by pathologic processes, and their effect upon the production of the nerve pain which

we call headache. The author does not deal with the suppurative sinus directly. He considers the three varieties of nasal disease, which have as symptoms headache, and more or less eye disorder, to be:

First—Closure of the frontal sinus without suppuration, i. e.: a vacuum frontal headache. The absolutely diagnostic symptom of closure of the frontal sinus without suppuration is Ewing's sign; a tender spot at the upper inner angle of the orbit at the point of attachment of the pulley of the superior oblique, and internal and posterior to it.

Second—Nasal ganglion neurosis, i. e.: that of the sphenopalatine or Meckel's ganglion, which while it lies deep in the sphenomaxillary fossa or close to the sphenopalatine foramen, is not always deep in the bone; but may be so close to the nasal membranes or paranasal cells as to be implicated by nasal inflammation, enlargement of the cavernous tissue, osteitis or enlargement of the bony structures or pressure from malformations

Third—Hyperplastic sphenoiditis.

As to treatment it is sometimes astonishing to see what may be accomplished by the simple application of astringents, 2 p. c. silver nitrate solution, 5 per cent carbolic acid in alcohol over the region of the outlet of the sinuses and over the region of the nasal ganglion and the vidian nerve.

The severest pain of photophobia, glaucoma, iritis, corneal ulcers, phlyctenular keratitis, interstitial keratitis may be stopped by anesthesia of the nasal ganglion, i. e.: strong cocaine solution applied thru the nose posterior and above the middle turbinal.

Sluder goes on in detail, in the various chapters, to point out the explanation of the relation of nasal to optic disorders; which, as a rule, is a hyperplastic bone process; the mode of operation being the narrowing of the bony canals thru which the respective nerves pass, i. e.: the optic canal with the optic nerve; the foramen rotundum transmitting the maxillary and the vidian nerves. Certain rather far-

fetched deductions are made, even apparently showing the relation of the sphenoid to the Eustachian tube with consequent deafness and tinnitus. Most of the permanent results of treatment are shown by him to be accomplished only by intranasal operations, varying from removal of the midturbinal to actual excision and curettement of the walls of the various sinuses.

Sixty-seven pages of the book are given up to case histories, apparently showing the relation of the nasal structure to the eye, and to headache or the symptoms connected therewith. The book is well printed and illustrated, and is of decided value to the ophthalmologist as well as to the rhinologist.  
H. V. W.

## CORRESPONDENCE.

### A NOTE FROM LABRADOR.

[When the Hun is eliminated the perpetual war with nature and disease must not be forgotten. The development of courage and capacity, strikingly characteristic of medical war service, goes on in times of peace along the front lines of civilization. Reminders of this are so important that we have obtained the consent of the writer to publish extracts from a letter written to the late Col. Todd, in ignorance of his death; which recently came to the hands of the Editor.]

"In times of peace the only boat which plies between St. John's and this place makes a fortnightly trip; it rarely happens that we can connect with the boat when coming from the United States. Now we are short of everything. This only boat is running on the southern route to New York, and her cabin has been taken out to make room for freight. The boats now in service on this coast are old sealers, and dirty for women to travel in; but I have never heard a complaint from any of our volunteer women workers. We are short of doctors, nurses, and supplies. Our mission schooner, with our summer food and hospital supplies, is being held up at Boston. Whether this be on account of the Hun submarine menace, or because the U. S. is

so exacting—and properly so, in regard to granting release of shipments to foreign ports, we are unable to learn. However, we are accustomed to making shift, and we shall, no doubt, pull through, even should the schooner encounter the Hun en route. We are very busy; therefore, as we learn here to be busy, we are in no sense disappointed.

Dr. Grenfell has just left here on his hospital ship, on his mission of mercy in the North. It has required sustained courage in this gifted and best of men, to work as he has done on this coast for twenty-five years. Only

those who have worked with him can understand what that work means on this angry coast. This is my seventh summer as a volunteer worker with Grenfell. I should have been ashamed of myself if I had remained in the land of pure delight this summer, when I knew of the stress here. It would have been like going back on a friend in trouble. After all what do we live for if it be not to make life less difficult for others?"

Sincerely yours,

JOSEPH A. ANDREWS.

St. Anthony, Newfoundland.

## NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. As these columns go to press on the 30th of the month contributors should send in their items by the 25th. The following gentlemen have consented to supply the News Item Editor with the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, La Fayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala, City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. Geo. M. Waldeck, Detroit. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered, as well as all foreign countries. Volunteers are therefore needed and it is hoped that they will respond promptly to this call.

### DEATHS.

William A. Dietrich, Chattanooga, Tennessee, aged 60, died at the home of his sister, in St. Joseph, Michigan, about August 13th.

Dr. J. M. Ray of Louisville, Ky., died Oct. 11th.

### PERSONAL.

Dr. John A. Donovan, of Butte, Montana, has regained health and resumed his practice October 1st.

C. R. Dufour, M. D., has been appointed Chairman of the Public Health Committee, by the President of the Washington Chamber of Commerce.

Dr. Clark W. Hawley, of Chicago, was thrown from his bicycle recently and sustained a painful fracture of the nose.

Argañaraz of Buenos Aires has described methods of recording nystagmic movements, with experiments on rabbits, by means of a modified Buys' nystagmograph.

The Kentucky State Medical Association has elected Dr. D. M. Griffith, of Owensboro, Kentucky, delegate to the next meeting of the American Medical Association.

Daniel M. Velez, M. D., Ophthalmologist of Mexico City, Donato Guerra 11, was a

recent visitor to the Ophthalmological Clinic at Marquette University Medical School, Milwaukee, Wisconsin.

### MILITARY.

Lieut. Colonel Nelson M. Black, of Milwaukee, is now in active service somewhere in France.

Capt. Frank R. Spencer, of the Medical Relief Corps, Boulder, Colorado, has been assigned to Camp Lewis.

Dr. H. H. Stark, of El Paso, Texas, has accepted a Captaincy in the M. R. C., and will be stationed at the Base Hospital, Camp Travis, Fort Sam Houston.

Major P. J. H. Farrell, of Chicago, has recently arrived in France, from Camp Travis, Texas. There are with him, engaged in overseas service, nineteen nephews, two sons and a son-in-law.

Capt. James Melville Shields, of Grand Junction, Colo., is now in Italy with Base Hospital 102, American Expeditionary Forces. This hospital unit was organized at the Tulane University, New Orleans, and financed by a patriotic lady of that city.

The change of address of the following Ophthalmologists from New Orleans is



noted: Capt. Arthur Whitmire, Camp Gordon, Georgia; Lieut. John F. Dunn, Camp Greenleaf, Ft. Oglethorpe, Georgia; Lieut. Geo. J. Taquino, Camp Greenleaf, Ft. Oglethorpe, Georgia.

Capt. James M. Patton has been promoted to Major, and will assist Major A. C. Stokes, also of Omaha, in command of Hospital Unit No. 49. The base hospital in the care of this unit has been divided into two sections, known as 49, and 49A, and Major Patton is in charge of the former.

Maj. Thos. A. Woodruff, stationed at Camp Meade, was recently in Chicago on a visit.

#### SOCIETIES.

The Pacific Coast Oto-Ophthalmological Society had a very successful and profitable meeting in Salt Lake City, August 12th and 13th. The hosts were voted royal entertainers and everyone went home singing the praises of Salt Lake. Dr. Cullen F. Welty of San Francisco was elected President, and Dr. Aaron S. Green of San Francisco was elected Secretary. San Francisco was selected as the next place of meeting.

#### MISCELLANEOUS.

The translation of the American Encyclopedia of Ophthalmology, edited by Dr. Casey A. Wood, into Spanish is proposed.

By the will of the late Marie Louise Tilotson, the New York Eye and Ear Infirmary was bequeathed \$5,000, and the Society for the Relief of the Destitute Blind was left \$10,000.

Two midwives were recently fined \$10.00 each, by Judge Frye of Illinois, for failure to observe the requirements of the Act for the Prevention of Ophthalmia Neonatorum.

In a decision granted by the Supreme Court, August 14th, in the case of W. A. Beardsley versus Drs. Fred E., and John Ewing of Kenmare, in which damages were claimed on account of alleged mistreatment in a case of disease of the eye, the decision of the District Court is said to have been affirmed which awarded the complainant \$7,500 damages.

The Medical School of the University of Minnesota offers teaching fellowships for graduate work in Internal Medicine, Surgery, Obstetrics, Pediatrics and Ophthalmology and Oto-Laryngology. These fellowships cover a period of three years' study, and lead to the Doctor's degree in Science or Philosophy. They are under stipends of \$500, \$750, and \$1,000 for each of the successive years.

The U. S. Employees' Compensation Commission, Bureau of Standards, has issued specifications covering tentative standards for head and eye protection prepared in

conjunction with the Safety Engineers of Federal Industrial Establishments. It is believed that the Bureau will be very glad to receive suggestions from ophthalmologists concerning the establishment of such standards.

"A conference under the auspices of the national subcommittee on welfare work of the committee on labor of the Advisory Commission of the Council of National Defense has reported, thru Samuel Gompers to Secretary William B. Wilson of the Department of Labor; that at its last meeting the Committee recommended that medical examination of workers be one of the functions of the government labor recruiting agency; recommending also the establishment of a central examining board to issue cards indicating the health of workers, and classifying them according to physical fitness." (Journal of the A. M. A.) The advisability of the formation of such a board for examination of employes was suggested by Dr. V. A. Chapman of Milwaukee, in a paper presented before the American Academy of Ophthalmology and Oto-Laryngology at Pittsburgh, October 30, 1918.

The importance of differentiating between those who are dangerously color-blind—that is, unable at all times to distinguish between red and green—and those who are only slightly color-blind, is brought out in a recent study conducted by the U. S. Public Health Service, and reported in Public Health Bulletin No. 92.

The following classes are regarded as dangerously color-blind and therefore to be excluded from positions in which they would be required to read colored signal lights: (1) those who are able to see but three or less colors in the spectrum, (the normal person sees six or seven); (2) those who see more than three colors in the spectrum, but who have the red end so shortened as to prevent the recognition of a red light at a distance of two miles; and (3) those with a central scotoma (that is, a blind or partially blind area in the field of vision) for red and green.

It was concluded that this class of persons could be distinguished from those harmlessly color blind by the use of the Edridge-Green color lantern, which was found preferable to colored yarns.

Another feature of the investigation was the study of the prevalence of color blindness. Excluding those able to distinguish five colors in the spectrum, it was found that color blindness occurs in about 8.6 per cent of men and 2.2 per cent of the women. Color blindness of a degree dangerous in occupations requiring the recognition of colored signal lights was found to occur in about 3.1 of men and 0.7 per cent of women.

# OPHTHALMIC LITERATURE

Under this head continuing the "Index of Ophthalmology" heretofore published in *Ophthalmic Literature* will be found the subjects of all published papers received during the last month, that bear to an important extent upon ophthalmology. The subject is indicated rather than the exact title given by the author. Where the original title has been in a foreign language it is translated into English. The journal in which the paper is published will indicate the language of the original.

The names of the different journals are indicated by abbreviations which generally correspond to those used by the *Index Medicus*, the *Journal of the American Medical Association*, and the *British Journal of Ophthalmology*. We will from time to time publish the list of ophthalmic journals, with the abbreviations used for each. Often a single letter discriminates between journals published in different languages. Thus "Arch. of Ophth." refers to the Archives of Ophthalmology, published in English; "Arch. d'Ophth.," indicates the French Archives d'Ophthalmologie; "Arch. de Oftal." refers to the Archivos de Oftalmologia Hispano-Americanos, while "Arch. di Ottal." indicates the Italian Archivio di Ottalmologia.

In this index of the literature the different subjects are grouped under appropriate heads; so that all papers bearing on the same, or closely related subjects, will be found in one group. The succession of the groups is the same from month to month, and identical with that of the Digest of the Literature. Where a paper clearly refers to two subjects that belong in different groups, it will be noticed in both groups.

Each reference begins with the name of the author in heavyface type. This is followed by the subject of his paper. Then in brackets a number with (ill.) indicates the number of illustrations, or a number with (pl.) the number of plates illustrating the article, (col. pl.) indicates colored plates. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that the paper was read before some society and gave rise to a discussion which is published with it.

The "repeated titles" may render accessible the essential part of a paper, the original of which could not be consulted. These give (in brackets) after the author's name the volume and page of this department of "Ophthalmic Literature" where the title of the paper will be found; and then the journal, volume, and page where the translation or abstract is published.

It is desired to notice every paper as soon as possible after it is published. Readers will confer a favor by sending titles they notice have been omitted, with journal and page of publication; and of their own papers, sending either a copy of the journal in which each appeared, or a reprint. These should be sent as soon as possible to 318 Majestic Building, Denver, Colorado.

## METHODS OF DIAGNOSIS.

**Bachstsz, E.** Estimation of "Sellar" Length in Roentgen Image. (1 ill.) Zeit. f. Augenh., v. 36, 62.

**Beck, E. G., and Smith, E. D.** Stereoscopic Roentgenograms. Amer. Jour. Roent., v. 5, p. 369.

**Bruns, H. D.** Methods of Diagnosis in Ophthalmology. New Orleans Med. and Surg. Jour., v. 71, p. 145.

**Eppenstein, A.** Study of Field of Vision and Blind Spot with Prism Apparatus. Klin. Monatsbl. f. Augenh., v. 60, p. 620.

**Ezell, H.** Detection of Feigned Blindness. Jour. Tenn. State Med. Assn., v. 11, p. 150.

**Fleischer, B.** Campimetry after Bjerrum. Klin. Monatsbl. f. Augenh., v. 60, p. 265.

**Gleichen, A.** Theory of Acuteness of vision. (17 ill.) Graefe's Arch. f. Ophth., v. 93, p. 303.

**Gullstrand, A.** Macula in Red-free Light. Klin. Monatsbl. f. Augenh., v. 60, p. 289.

**Koeppe, L.** Observations with Nernst Lamp and Corneal Microscope. (Bibl.) Graefe's Arch. f. Ophth., v. 97, p. 1.

Microscopic Appearance of Macula with Gullstrand Nernst Lamp. (5 ill.) Graefe's Arch. f. Ophth., v. 95, p. 282.

**Lecha-Marzo, A.** Tear Sign of Death. Abst. Jour. A. M. A., v. 71, p. 1009.

**Pichler, A.** Simulated Contraction of Field. Graefe's Arch. f. Ophth., v. 94, p. 227.

**Stenvers, H. W.** Roentgenologic Remarks on Work of van der Hoeve and de Kleijn. (5 ill.) Graefe's Arch. f. Ophth., v. 95, p. 95.

**Terrien, F.** Factitious Diplopia. Paris Méd., v. 8, p. 462. Abst. Jour. A. M. A., v. 71, p. 859.

**Vogt, A.** Color of Macula. Klin. Monatsbl. f. Augenh., v. 60, p. 449.

Vertical Linear Pigmentation Observed in Retina of Young in Red-free Light. (1 col. pl.) Klin. M. f. Augenh., v. 60, p. 47.

## THERAPEUTICS.

**Domec.** Treatment of Ocular Affections by Intramuscular Injections. Clin. Ophth., v. 22, p. 579.

**Gjessing, H.** Idiosyncrasy for Mercury. (Bibl.) Klin. Monatsbl. f. Augenh., v. 60, p. 382.

**Hippel, E. v.** Treatment of Eyes and Lids with Radiation. (2 tables.) Graefe's Arch. f. Ophth., v. 95, p. 265.

**Jackson, E.** Daturin, A Cycloplegic Mydriatic. Amer. Jour. Ophth., v. 1, p. 673.

**Kudrnac, J.** Treatment of Pneumococcic Infections of Eye with Optochin. Deut. Med. Woch., 1917, No. 3. Clin. Ophth., v. 22, p. 619.

**Lundsgaard, K. K. K.** Disappointing Results from Parenteral Injections of Milk. Hospitalstidende, June, 1918, p. 826.

**Schanz, F.** Light Management in Diseases of Eye. (1 ill.) Zeit. f. Augenh., v. 36, p. 22.

**Seidel, E.** Light in Diseases of Eye. Graefe's Arch. f. Ophth., v. 93, p. 356.

**Szily, P. v., and Sternberg, A.** Bacteriotherapy and Chemotherapy in Ophthalmology. Klin. Monatsbl. f. Augenh., v. 60, p. 219.

**Tuberculin In Diseases of Eye.** New York Med. Jour., Sept. 7, 1918, p. 428.

#### OPERATIONS.

**Axenfeld, T.** Opticociliary Neurectomy. Klin. Monatsbl. f. Augenh., v. 60, p. 29.

#### REFRACTION.

**Blegvad, O.** Progression of Myopia. (12 charts.) Klin. Monatsbl. f. Augenh., v. 60, p. 155.

**Boegehold, H.** Value of Zeiss' Punktal and Katral Glasses. Klin. Monatsbl. f. Augenh., v. 60, p. 641.

**Brugh, J. P. van den.** Chronic Headaches an Asthenopic Symptom. (Dis.) Amer. Jour. Ophth., v. 1, p. 677.

**Emerson, L.** Duty of Family Physician to Patients Suffering from Headache, and Eyestrain. Jour. Med. Soc., New Jersey, v. 15, p. 303.

**Headaches Due to Poor Adjustment of Lenses.** Maine Med. Assn. Jour., v. 8, p. 327.

**v. Hippel, E.** Management of Keratoconus with Miller's contact Glasses. Klin. M. f. Augenh., v. 60, p. 49.

**Jahn, O.** Essential Improvement of Visual Acuity through Stenopeic Slit. (Bibl.) Klin. M. f. Augenh., v. 60, p. 181.

**McClelland, E. S.** Variable Hyperopic Astigmatism in Children. Med. Rec., v. 94, p. 276.

**Pyle, W. L.** Trial Frame for Test Lenses. (2 ill.) Jour. Amer. Med. Assn., v. 71, p. 966.

**Rezende, C.** Nervous Symptoms from Eyestrain. Abst. Jour. A. M. A., v. 71, p. 162.

**Rochon-Duvigneaud, A., and Merigot de Treigny, P.** Comparative Morphology of Eye in Emmetropia, Hypermetropia and Myopia, Methods of Treatment. (2 ill.) Ann. d'Ocul., v. 155, p. 309.

**Steiger, A.** Myopia. Zeit. f. Augenh., v. 36, p. 127.

#### OCULAR MOVEMENTS.

**Argañaraz, R.** Nystagmography. Abst. Jour. A. M. A., v. 71, p. 781.

**Geller, K., and Ohm, J.** Cortical Nystagmus in Soldier. (7 ill., Bibl.) Klin. M. f. Augenh., v. 60, p. 329.

**Herrman, C.** Headshaking with Nystagmus in Infant. Amer. Jour. Child. Dis., v. 16, p. 180.

**de Kleijn, A., and Leeuwen.** Nature of Caloric Nystagmus. (3 ill.) Graefe's Arch. f. Ophth., v. 94, p. 316.

**Kunz, L., and Ohm, J.** Pictures of Ocular Movements. (30 ill.) Graefe's Arch. f. Ophth., v. 93, p. 237.

**Lemere, H. B.** Oculomotor Reaction to Labyrinth Stimulation. Jour. A. M. A., v. 71, p. 901.

**Loeb, C.** Convergent Strabismus Treated by Atropin and Glasses. Hereditary Strabismus. Amer. Jour. Ophth., v. 1, p. 668.

**Löffler, W.** Nasal Herpes Zoster with Paralysis of Ocular Muscles. Corresp.-Bl. f. Schweiz. Aerzte, 1918, p. 942.

**Murray, W. R.** Vestibular Apparatus and Relation to Aviation. Jour.-Lancet, v. 38, p. 155.

**Ohm, J.** Registering Apparatus for Horizontal Eyelid Movements. (5 ill.) Zeit. f. Augenh., v. 36, p. 198.

**Nystagmus of Uncertain Etiology.** (58 ill.) Graefe's Arch. f. Ophth., v. 93, p. 412; v. 94, p. 164.

**Recognition of Miners' Nystagmus.** (3 ill.) Graefe's Arch. f. Ophth., v. 92, p. 1.

**Pichler, A.** Alternate Appearance and Disappearance of Bell's Phenomena in Facial Paralysis. (4 ill.) Klin. M. f. Augenh., v. 60, p. 573.

**Pikler, J.** Doubled and Simplified Kinematography and Kinematographic Nature of Binocular Vision. Klin. M. f. Augenh., v. 60, p. 794.

**Pockley, G. A.** Squint. Ophth. Soc., New South Wales, May 1, Med Jour., Australia, Aug. 10, 1918, p. 127.

**Smith, E. T.** Treatment of Squint. Med. Jour. of Australia, Aug. 17, 1918, p. 135.

**Witmer, J.** Nystagmography. (16 ill.) Graefe's Arch. f. Ophth., v. 93, p. 226.

#### CONJUNCTIVA.

**Bloch, C. E.** Xerophthalmia in the Young. Ugeskrift for Laeger. May, 1918.

**Carhart, M. W. D.** Diagnosis and Treatment of Follicular Conjunctivitis. Med. Rec., v. 93, p. 540.

**Friesen, H. J.** Ophthalmia Neonatorum. Jour.-Lancet, v. 38, p. 530.

**Fuchs, E.** Eosinophilia in Eye. Graefe's Arch. f. Ophth., v. 95, p. 162.

**Hiwatari, K.** Conjunctivitis Meibomiana. (Elschnig). Amer. Jour. Ophth., v. 1, p. 645.



**de Kleijn, A., and ten Doesschate.** Influence of Calcium Chlorid on Experimental Conjunctivitis. *Amer. Jour. Ophth.*, v. 1, p. 677.

**Koeppel, L.** Lymph Vessels of Bulbar Conjunctiva and Episclera under Corneal Microscope. (Bibl.) *Graefe's Arch. f. Ophth.*, v. 97, p. 1.

Normal and Pathologic Ratio of Veins in Bulbar Conjunctiva and Limbus. (Bibl.) *Graefe's Arch. f. Ophth.*, v. 94, p. 117.  
Findings in Region of Limbus. *Graefe's Arch. f. Ophth.*, v. 93, p. 275.

**Pockley, G. A.** Vernal Catarrh. *Ophth. Soc., New South Wales*, May 1. *Med. Jour., Australia*, August 10, 1918, p. 127.

**Pusey, W. A.** Treatment of Vernal Catarrh with Radium. *Jour. Amer. Med. Assn.*, v. 71, p. 806.

**Saunte.** Ugeskrift for Laeger., v. 80, p. 989.

Trachoma in Tennessee. *Jour. Tenn. State Med. Assn.*, v. 11, p. 169.

#### CORNEA AND SCLERA.

**Alajmo, L.** Reapers' Keratitis. *Abst. Jour. A. M. A.*, v. 71, p. 780.

**Düring, M., and Huber, O.** Febrile Corneal Herpes with Malaria. (4 ill.) *Klin. M. f. Augenh.*, v. 60, p. 368.

**Fuchs, E.** Damage to Cornea from Within. (17 ill.) *Graefe's Arch. f. Ophth.*, v. 92, p. 146.  
Anatomy of Corneal Staphyloma. (30 ill.) *Graefe's Arch. f. Ophth.*, v. 95, p. 215.

**Hauptman, A.** Myotonic Dystrophy with Cataract. (2 ill. Bibl.) *Klin. M. f. Augenh.*, v. 60, p. 576.

**Hippel, E. v.** Congenital Defect of Posterior Surface of Cornea. (5 ill.) *Graefe's Arch. f. Ophth.*, v. 95, p. 184.

**Hoeve, van der, J., and de Kleijn, A.** Blue Sclera, Fragile Bones and Deafness. (4 ill.) *Graefe's Arch. f. Ophth.*, v. 95, p. 81.

**Koeppel, L.** Corneal Changes Shown by Nernst Lamp. (1 ill.) *Graefe's Arch. f. Ophth.*, v. 94, p. 250.  
Normal Cornea and Its Diseases Shown by Nernst Lamp. *Graefe's Arch. f. Ophth.*, v. 93, p. 173.

**Kurnitzky, E.** Radiation of Cornea with Ultraviolet Rays. (1 ill. Bibl.) *Klin. M. f. Augenh.*, v. 60, p. 198.

**Löwenstein, A.** Appearance of Parenchymatous Corneal Burn. *Graefe's Arch. f. Ophth.*, v. 94, p. 236.

**Piesbergen and Weiss.** Treatment of Corneal Ulcer with Hydrogen Peroxide. (Ortizón.) *Clin. Opht.*, v. 22, p. 612.

**Pockley, G. A.** Monocular Episcleritis. *Ophth. Soc., New South Wales*, May 1. *Med. Jour., Australia*, August 10, 1918, p. 127.

**Rothschild, L.** Intracorneal Tattooing on Animals. *Graefe's Arch. f. Ophth.*, v. 95, p. 130.

**Stahli, J.** Fleischer's Ring in Keratoconus; a New Type of Pigmentation in Corneal Epithelium. (7 ill.) *Klin. M. f. Augenh.*, v. 60, p. 721.

**Uthoff, W.** Typical Case of Band-like Opacity of Cornea. (7 ill.) *Klin. M. f. Augenh.*, v. 60, p. 11.

#### ANTERIOR CHAMBER AND PUPIL.

**Kahn, R. H.** Physiologic Pupillary Segment. (3 ill.) *Graefe's Arch. f. Ophth.*, v. 95, p. 73.

#### UVEAL TRACT.

**Fuchs, E.** Luetic Choroiditis. (8 ill. Bibl.) *Graefe's Arch. f. Ophth.*, v. 97, p. 85.  
Loops of the Ciliary Nerves. (11 ill.) *Klin. M. f. Augenh.*, v. 60, p. 3.  
Heterochromia with Remarks on Congenital Anomalies. (4 ill.) *Graefe's Arch. f. Ophth.*, v. 93, p. 381.

**Gjessing, H.** Tuberculosis a Cause of "Febris Uveoparatoidea." *Klin. M. f. Augenh.*, v. 60, p. 249.

**Harrison, W. G.** Rôle of Teeth and Tonsils in Etiology of Inflammatory Eye Diseases. (Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 660.

**Herrenschwand, F.** Kinds of Heterochromic Irides. (Bibl.) *Klin. M. f. Augenh.*, v. 60, p. 467.

**Hippel, E. v.** Gonorrheal Iridocyclitis and Optic Neuritis. *Graefe's Arch. f. Ophth.*, v. 94, p. 356.

**Koeppel, L.** Pigmentation of Pupillary Margin, Its Degenerative Changes and Glandular Structure. *Graefe's Arch. f. Ophth.*, v. 93, p. 152.

**Marin Amat, M.** Polycoria. (2 ill.) *Arch. f. Oftal., Hisp.-Amer.*, v. 18, p. 329.

**Meller, J.** Hydrophthalmos Following Congenital Anomaly of Iris. (5 ill.) *Graefe's Arch. f. Ophth.*, v. 92, p. 34.

**Nicolai.** Dilator of Pupil. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 674.

**Pacheco Luna, R.** Acute Iritis Developed after Amebic Dysentery. *Amer. Jour. Ophth.*, v. 1, p. 659.

**Shoemaker, S. A.** Ocular Disease Due to Focal Infections. *Jour. Indiana State Med. Assn.*, v. 11, p. 305.

**Uthoff, W.** Gumma of Uveal Tract, with Perforation Through Sclera. *Klin. M. f. Augenh.*, v. 60, p. 20.

**Wirtz, R.** Inflammatory Disease of Eye After Oral Infection. (14 ill.) *Klin. M. f. Augenh.*, v. 60, p. 58.

#### SYMPATHETIC DISEASE.

**Elschnig, A.** Sympathetic Ophthalmia After Preventive Enucleation or Evisceration. *Graefe's Arch. f. Ophth.*, v. 92, p. 505.

**Faith, T.** Sympathetic Ophthalmia. *Amer. Jour. Ophth.*, v. 1, p. 679.

Hippel, E. v. Tuberculosis, Sympathetic and Proliferating Uveitis of Unrecognized Etiology. (25 ill.) Graefe's Arch. f. Ophth., v. 92, p. 421.

#### GLAUCOMA.

Elschnig, A. Pulsating Exophthalmos and Glaucoma. Graefe's Arch. f. Ophth., v. 92, p. 101.

Glaucoma and Blood Pressure. Graefe's Arch. f. Ophth., v. 92, p. 237.

Gutfreund, F. Binocular Pulsating Vortex Vein. Klin. M. f. Augenh., v. 60, p. 259.

Hoeve, van der, J. Field of Vision and Choice of Operation in Glaucoma. Zeit. f. Augenh., v. 36, p. 232.

Koeppel, L. Meaning of Pigment in Glaucoma, Early Diagnosis with Nernst Lamp. (1 ill.) Graefe's Arch. f. Ophth., v. 92, p. 341.

Koster, W. Lens Opacity and Acute Glaucoma. Zeit. f. Augenh., v. 36, p. 66.  
Pseudo-glaucoma Simplex. Zeit. f. Augenh., v. 36, p. 198.

Lebensohn, M. H. Peripheral Iridectomy Combined with Scleral Trephining. Amer. Jour. Ophth., v. 1, p. 684.

Parker, W. R. Management of Non-inflammatory Glaucoma Classified as Simple, Anterior, or Simple Posterior Glaucoma. Amer. Jour. Ophth., v. 1, p. 628.

Plocher, R. Juvenile Familial Glaucoma. (Bibl.) Klin. M. f. Augenh., v. 60, p. 592.

Seidel, E. Rise and Fall of Intraocular Lymph Stream. (10 ill.) Graefe's Arch. f. Ophth., v. 95, p. 1.

Thomsen, H. Recent Acute Inflammatory Glaucoma. (7 ill. Bibl.) Klin. M. f. Augenh., v. 60, p. 339.

#### CRYSTALLINE LENS.

Díaz Caneja, E. Ocular Lesions Provoked by Naphthalin. Arch. de Oftal. Hisp.-Amer., v. 18, p. 313.

D'Ombraín, E. A. Traumatic Dislocation of Lens. Ophth. Sec. Med. Soc., New South Wales, May 1, Med. Jour., Australia, Aug. 10, 1918, p. 126.

Goldschmidt, M. Physiology and Pathology of Crystalline Lens. (3 ill. Bibl.) Graefe's Arch. f. Ophth., v. 93, p. 447.

Klauber, E. Opacity of Anterior Surface of Lens. Klin. M. f. Augenh., v. 60, p. 764.

Koster, W. Spontaneous Resorption of Senile Cataract. Zeit. f. Augenh., v. 36, p. 57.

Krenger, O. Frequency and Localization of Lens Opacity in 401 Persons from 7 to 21 Years. (4 ill. Bibl.) Klin. M. f. Augenh., v. 60, p. 229.

Scalinci, N. Senile Cataract. Abst. Jour. A. M. A., v. 71, p. 860.

Spiece, W. K. Ectopia Lentis with Family History. (Dis.) Amer. Jour. Ophth., v. 1, p. 681.

Stock, W. Zonulotomy. Klin. M. f. Augenh., v. 60, p. 388.

Timberman, A. J. Things I Have Learned in Cataract Work. Ohio State Med. Jour., v. 14, p. 536.

Vogt, A. Lamellar Cataract. (8 ill.) Klin. M. f. Augenh., v. 60, p. 34.

#### RETINA.

Behr, C. Adaptation to Dark in Different Ocular Diseases. (4 ill.) Klin. M. f. Augenh., v. 60, p. 447.

Birch-Hirschfeld, A. Night Blindness in War. (7 ill.) Graefe's Arch. f. Ophth., v. 92, p. 273.  
Night Blindness. Klin. M. f. Augenh., v. 60, p. 53.

Dor, L. Traumatic Hemeralopia. Clin. Ophth., v. 22, p. 610.

Fuchs, E. The Macula Lutea in Eye Diseases. (16 ill.) Graefe's Arch. f. Ophth., v. 97, p. 57.

Congenital Abnormality of Retina, Scleral Indentation and Choroidal Detachment. (5 ill.) Graefe's Arch. f. Ophth., v. 94, p. 107.

Anatomic Findings, Congenital Anomalies of Retina and Optic Nerve. (17 ill.) Graefe's Arch. f. Ophth., v. 93, p. 1.  
Pigment Bands in Background of Eye. Klin. M. f. Augenh., v. 60, p. 797.

Goldman, R. Hemeralopia as a Cerebral Symptom. Zeit. f. Augenh., v. 36, p. 220.

Hippel, E. v. Diffuse Glioma of Retina and Its Relation to Angiomatosis. (2 ill.) Graefe's Arch. f. Ophth., v. 95, p. 173.

Hubener. Hemeralopia and Adaptation in Soldiers. (23 ill. Bibl.) Graefe's Arch. f. Ophth., v. 93, p. 360.

Junius. Nightblindness in War. Zeit. f. Augenh., v. 36, p. 49.

Köhne, W. Angioid Streaks in Retina. (1 ill.) Graefe's Arch. f. Ophth., v. 95, p. 97.

Kraupa-Runk, M. Congenital Anastomosis of Papillar and Retinal Vessels. (2 ill. Bibl.) Zeit. f. Augenh., v. 36, p. 217.

Magnusson, H. Night Blindness in Dog. (7 ill.) Graefe's Arch. f. Ophth., v. 93, p. 404.

Ogata, D., and Weymouth, F. W. Refractive Differences in Foveal and Parafoveal Vision. (Bibl.) Amer. Jour. Ophth., v. 1, p. 630.

Schmidt, H. Suppurative Chorioretinitis Provoked by Larva of Fly, Resulting in Detachment of Retina. Cent. f. p. Augenh., Jan.-Feb., 1917. Clin. Ophth., v. 22, p. 627.

Schoeler, F. Choroido-retinal inflammation from Carbon Dioxide Snow. Klin. M. f. Augenh., v. 60, p. 1.

Sedwick, W. A. Retinitis Atrophicans Centralis (Hole in Macula). (1 ill.) Amer. Jour. Ophth., v. 1, p. 673.

Vogt, A. Ophthalmoscopic Symptom of Retinal Atrophy Following Retinal and Optic Nerve Disease. Klin. M. f. Augenh., v. 60, p. 324.



- Waardenburg, P. J.** Crystalloid Formation in Retina with Disturbance of Field of Vision. *Amer. Jour. Ophth.*, v. 1, p. 675.
- Young, W. R.** Retinal Detachment Traumatic(?). *Amer. Jour. Ophth.*, v. 1, p. 694.

#### TOXIC AMBLYOPIAS.

- Elliot, R. H.** Quinin Poisoning, Its Ocular Lesions and Visual Disturbances. (Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 650.

#### OPTIC NERVE.

- Eppenstein, A.** Optic Neuritis and Iridocyclitis Following Measles. *Klin. M. f. Augenh.*, v. 60, p. 245.
- Halliday, J. C.** Congenital Pseudo Optic Neuritis. *Ophth. Soc., New South Wales*, May 1. *Med. Jour., Australia*, Aug. 10, 1918, p. 127.
- Harkness, C. A.** Loss of Vision Due to Lack of Ovarian Secretion. *Jour. Amer. Inst. Homeop.*, v. 11, p. 271.
- Klauber, E.** Edema of Optic Nerve Head in Cerebral Injury. (Bibl.) *Klin. M. f. Augenh.*, v. 60, p. 504.
- Köhne, W.** Circumscribed Pit in Region of Optic Nerve Entrance. (1 ill. Bibl.) *Zeit. f. Augenh.*, v. 36, p. 212.
- Mussio-Fournier, J. C.** Double Optic Neuritis with Hypophysis Disease, Treatment with Glandothyrene. (Bibl.) *Ann. d'Ocul.*, v. 155, p. 315.
- Oloff, H.** Tuberculous Disease of Optic Nerve. (Bibl.) *Klin. M. f. Augenh.*, v. 60, p. 552.
- Optic Atrophy After Mumps.** *Maine Med. Assn.*, v. 8, p. 327.

#### VISUAL TRACTS AND CENTERS.

- Adson, A. W.** Hypophyseal Tumors Through the Intradural Approach. *Jour. Amer. Med. Assn.*, v. 71, p. 721.
- Ascher, K. W.** Secondary Impulse in Depth Perception and Habit of Monocular Vision. *Graefe's Arch. f. Ophth.*, v. 94, p. 275.
- Best, F.** Hemianopsia and Mind Blindness with Injury to Brain. (39 ill.) *Graefe's Arch. f. Ophth.*, v. 93, p. 49.
- Ischreyt, G.** Tower Skull with Eye Disorders. *Klin. M. f. Augenh.*, v. 60, p. 112.
- Pacheco Luna, R.** Total Hysteric Amaurosis. *Arch. de Oftal., Hisp.-Amer.*, v. 18, p. 335.
- Rasquin, E.** Disability from Hemianopsia. *Arch. Med. Belges*, v. 71, No. 1. *Abst. Jour. A. M. A.*, v. 71, p. 777.
- Roelofs, C. O., and Zeemann, W. P. C.** Binocular Clearness of Perception. (6 ill.) *Graefe's Arch. f. Ophth.*, v. 92, p. 527.

#### EYEBALL.

- Haden, H. C.** Metastatic Endophthalmitis with Epidemic Cerebro-Spinal Meningitis. (1 ill. Bibl.) *Amer. Jour. Ophth.*, v. 1, p. 647.

- Hanssen, R.** Stump After Removal of Eyeball. (3 ill.) *Klin. M. f. Augenh.*, v. 60, p. 629.

- Meisner, W.** Congenital Microphthalmos with Persistent Pupillary Membrane and other Anomalies. (2 ill. Bibl.) *Graefe's Arch. f. Ophth.*, v. 94, p. 301.

- Meller, J.** Spontaneous Bursting of Eyeball. *Klin. M. f. Augenh.*, v. 60, p. 458.

- Rahnenführer, E.** Anatomic Findings in Microphthalmos Including Remarks on Capsule and Cystoid Degeneration of Retina. *Graefe's Arch. f. Ophth.*, v. 92, p. 77.

- Weigelin, S.** Spontaneous Luxation of Eyeball. (2 ill.) *Klin. M. f. Augenh.*, v. 60, p. 262.

#### LACRIMAL APPARATUS.

- Duhamel, A.** Spontaneous Luxation of Lacrimal Gland. *Ann. d'Ocul.*, v. 155, p. 341.
- Hötte, F. A.** Dacryocystorhinostomy with Modification and Total Extirpation with Rhinostomy. (Bibl.) *Klin. M. f. Augenh.*, v. 60, p. 358.
- Santonoceto, O.** Experimental Dacryocystitis in Dog. (3 ill.) *Graefe's Arch. f. Ophth.*, v. 93, p. 299.

#### LIDS.

- Carsten, P.** Ectopharon-prothesis. (3 ill.) *Zeit. f. Augenh.*, v. 36, p. 209.
- Koster, W.** Slight Variation of Entropion Operation after Carron du Villards. (2 ill.) *Zeit. f. Augenh.*, v. 36, p. 32.
- Kuhnt, H.** Reconstruction of Whole Thickness of Lid. (24 ill.) *Zeit. f. Augenh.*, v. 36, p. 197.
- Plastic Operation on Eyeball, Lids and Orbit.** *Zeit. f. Augenh.*, v. 36, p. 1.
- Sheperd, C.** Operation for Tarsectomy. (Dis.) *Ophth. Soc., New South Wales*, May 1. *Med. Jour., Australia*, Aug. 10, 1918, p. 126.

#### ORBIT.

- Cords, R.** Severe Orbital Hemorrhage. (4 ill. Bibl.) *Klin. M. f. Augenh.*, v. 60, p. 759.
- Gifford, H.** Treatment of Blood Cysts of Orbit. *Amer. Jour. Ophth.*, v. 1, p. 625.
- Pichler, A.** Traumatic Enophthalmos in Three Years of War. (31 ill.) *Graefe's Arch. f. Ophth.*, v. 95, p. 145.
- Salus, R.** Bilateral Pulsating Exophthalmos. (1 ill.) *Klin. M. f. Augenh.*, v. 60, p. 253.
- Schründer, F.** Recognition of Intermittent Exophthalmos. *Graefe's Arch. f. Ophth.*, v. 93, p. 399.
- Sloan, E. P.** Exophthalmic Goiter. *Ill. Med. Jour.*, v. 34, p. 155.
- Stanton, E. M.** Prognosis of Exophthalmic Goiter. *Amer. Jour. Med. Sc.*, v. 156, p. 369.

#### PARASITES.

- Carsten, P.** Subretinal Cysticercus. (2 col. pl., 2 ill. Bibl.) *Zeit. f. Augenh.*, v. 36, p. 203.
- Stock, W.** Cysticercus in Vitreous. (2 ill. Bibl.) *Klin. M. f. Augenh.*, v. 60, p. 791.



## TUMORS.

- Fehr.** Ophthalmoscopic Picture of Metastatic Choroidal Carcinoma. (7 ill.) *Klin. M. f. Augenh.*, v. 60, p. 741.
- Fuchs, E.** Pigmented Melanoma and Sarcoma of Choroid. (41 ill.) *Graefe's Arch. f. Ophth.*, v. 94, p. 43.
- Hippel, E. v.** Changes in Eye Through Pressure of Orbital Tumor. *Klin. M. f. Augenh.*, v. 60, p. 390.

## INJURIES.

- Baumgärtner, H.** Traumatic Luxation of Eyeball. *Klin. M. f. Augenh.*, v. 60, p. 787.
- Birch-Hirschfeld.** Plastic Operations on Lids, Conjunctiva and Orbit Wounded by Shot. (10 ill.) *Zeit. f. Augenh.*, v. 36, p. 36.
- Burleson, J. H.** Method of Repair of Corneal Injuries. *Tenn. State Jour. Med.*, v. 14, p. 172.
- Duhamel, A.** Frequency of Penetrating Wounds of Eye by Foreign Bodies, and Their Extraction When Non-traumatic. *Ann. d'Ocul.*, v. 155, p. 343.
- Emanuel, C.** Ophthalmic Experiences in the Field. *Klin. M. f. Augenh.*, v. 60, p. 777.
- Engelbrecht, K.** Determining Position of Foreign Bodies in Eyeball with Stereoktiagraphy. *Klin. M. f. Augenh.*, v. 60, p. 757.
- Withdrawal of Non-magnetic Foreign Bodies from Interior of Eye. (2 ill.) *Graefe's Arch. f. Ophth.*, v. 94, p. 329.
- Igersheimer.** Anatomy of Contusion of Eyeball thru Injury of Protective Covering. (3 ill.) *Graefe's Arch. f. Ophth.*, v. 93, p. 269.
- Lamb, H. D.** Extraction of Foreign Bodies from Vitreous Chamber. *Interstate Med. Jour.*, v. 25, p. 577.
- Meller, J.** Lesions of Choroid and Retina after Shot Through Orbit. (2 ill.) *Klin. M. f. Augenh.*, v. 60, p. 494.
- Morax, V.** Lesions of Ciliary Body and Crystalline Lens from High Voltage Current. *Ann. d'Ocul.*, v. 155, p. 336.
- Pichler, A.** Dispersion of Stone Dust Over Iris. (4 ill.) *Klin. M. f. Augenh.*, v. 60, p. 102.
- Wachtler, G.** Severe Injury to Eye by Chestnut Burr. *Klin. M. f. Augenh.*, v. 60, p. 379.

## GENERAL DISEASES.

- Adams, W. H.** Points in Ophthalmology for General Practitioner. *Jour. Florida Med. Assn.*, v. 5, p. 21.
- Avata, A. A., and Woodyatt, R. T.** Treatment of Facial Erysipelas at Camp Cody. (2 ill.) *Jour. Amer. Med. Assn.*, v. 71, p. 900.
- Cramer, E.** Tuberculous Optic Neuritis. (2 ill.) *Klin. M. f. Augenh.*, v. 60, p. 566.

- Fernandez, F. M.** Ocular Tuberculosis. *Revista Med. y Cirurg.* 1918, p. 353. *Abst. J. A. M. A.*, v. 71, p. 1015.
- Hippel, E. v.** Recognition of Rare Tuberculous Eye Diseases. (2 ill.) *Graefe's Arch. f. Ophth.*, v. 95, p. 255.
- Kummell, R.** Ocular Changes in Leukemia. (Bibl.) *Graefe's Arch. f. Ophth.*, v. 95, p. 105.
- Lavagna, L.** Late Ocular Complications in Cerebro-spinal Meningitis. (3 ill.) *Clin. Opht.*, v. 22, p. 595.
- Morax, V.** Ocular Troubles in Lethargic Encephalitis. (Bibl.) *Ann. d'Ocul.*, v. 155, p. 345.
- Schevensteen, A.** Ocular Lesions in General Neurofibromatosis. (Bibl.) *Ann. d'Ocul.*, v. 155, p. 328.
- Unger, H.** Etiology and Symptomatology of Infantile Paralysis. (Bibl.) *Klin. M. f. Augenh.*, v. 60, p. 802.
- Repeated Titles. **Richard** (v. 1, p. 460). *Amer. Jour. Ophth.*, v. 1, p. 688.

## HYGIENE.

- Beeman, C. E.** Care of Eyes in Infancy. *Jour. Amer. Inst. Homeop.*, v. 11, p. 269.
- Friesen, H. J.** Ophthalmia Neonatorum the Cause of Preventable Blindness. *Jour. Lancet*, v. 38, p. 530.
- Higgins, C.** Triplex Glass. (1 ill.) *Lancet*, Aug. 17, 1918, p. 226.
- Prevention of Blindness. *Jour. Amer. Med. Assn.*, v. 71, p. 985.

## OPHTHALMIC SOCIOLOGY AND HISTORY.

- Ferro, P. B.** Visual Acuity in Schools. *Semana Med.*, v. 25, p. 599.
- Henker, O.** Founding of Jena Optical School. *Klin. M. f. Augenh.*, v. 60, p. 392.
- Ingram, L. C.** Qualification of Examiner and Examination to Correct Defects of Sight. *Florida Med. Assn. Jour.*, v. 4, p. 361.
- Jackson, E.** An Ophthalmic Adventurer, Julius Homberger. *Amer. Jour. Ophth.*, v. 1, p. 689.
- Levi-Sandes, E.** Ophthalmic Experiences in Field Hospital. *Klin. M. f. Augenh.*, v. 60, p. 266.
- Loeb, C.** Plan for Mobilization of Physicians. *Amer. Jour. Ophth.*, v. 1, p. 692.
- Notification of Ophthalmia Neonatorum Compulsory in Scotland. *Brit. Med. Jour.*, Aug. 17, 1918, p. 173.
- Report of Puerperal Septicemia and of Suppurative Conjunctivitis. *Weekly Bull. Dept. of Health, New York*, v. 7, p. 258.
- Rohr, M.** Development of Special Profession of Spectacle Makers. *Klin. M. f. Augenh.*, v. 60, p. 145.
- Treatment of Blind. *Canadian Practitioner and Rev.*, v. 43, p. 276.
- Würdemann, H. V.** Frank Chisholm Todd. *Amer. Jour. Ophth.*, v. 1, p. 692.

# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 1

NOVEMBER, 1918

No. 11

## TUBERCULIN IN DISEASES OF THE EYE.

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NEW YORK.

This paper takes up the indications for the use of tuberculin, the different preparations, the dose, and the proper period for its therapeutic use. It was read before the American Ophthalmological Society, July 9th, 1918, and the interesting discussion it excited is reported page 791.

This paper is written principally for the purpose of exciting a discussion of the questions raised, namely: 1st, In what condition of the eye and its adnexa is the use of tuberculin indicated? 2nd, What form of tuberculin can be used to best advantage in diagnosis and in treatment? 3rd, In what dose and for how long a period should tuberculin be used in the treatment of affections of the eye?

In regard to the first question, it may be held broadly that all of those cases in which a diagnosis of tuberculosis as a cause can be established beyond doubt, and also in the class of cases in which tuberculosis as a cause cannot be satisfactorily established, but in which improvement follows the therapeutic use of tuberculin.

### DIAGNOSTIC USE.

In establishing a diagnosis of a tubercular process in the eyes, the subcutaneous injection of old tuberculin "T. O.," is the procedure now generally considered to be the best. Trudeau has found that the subcutaneous injection of 9 mg. of old tuberculin will produce a rise of temperature in a healthy adult; hence it is necessary to employ a smaller dose in conducting this test. In my experience it has been perfectly satisfactory to begin the test with 1 mg. in the adult,  $\frac{1}{2}$  mg. in children. (The temperature of the patient should be taken twice in twenty-four hours for one or two days before

giving the injection and the injection given only if the temperature is normal).

The injection is repeated if no local reaction (at the site of the inflammatory process in the eye) is obtained forty-eight to seventy-two hours later, provided the patient's temperature has remained below normal for the preceding twenty-four hours, using 2 mg., and again in forty-eight to seventy-two hours, using 3 mg. if a satisfactory reaction is not obtained by the smaller dose. It may be justifiable in certain cases to use a larger dose, as in some cases of small tubercular foci the smaller dose is not sufficient to excite the reaction.

The local reaction in conjunctival tuberculosis is indicated by an increase in hyperemia at the site of the lesion. In scleral and corneal lesions there is increase in pericorneal injection, the conjunctiva nearest the lesion being most affected, slight increase in the density of the tissues at the lesion and in cloudiness of immediately adjacent cornea. In iris tuberculosis an apparent exacerbation of the process is manifest by increase of hyperemia at the base; slight enlargement of the tuberculous masses and haziness of aqueous over the lesion. If the white, fluffy "mutton-fat" exudation is present this may be slightly increased in amount. Some increase in pericorneal injection and slight pain referable to the eye may be produced. The same changes

may also occur in ciliary tubercular processes.

In tuberculosis of the choroid the haziness over the affected area may be increased, the area involved slightly enlarged; and minute grayish punctate patches appear at the margin of the lesion, and vision becomes more impaired. In tuberculosis of the retina and optic nerve head similar changes may be produced. In order to observe these changes the eyes must be examined from time to time from twelve to thirty-six hours after the injection, and the condition compared with that preceding the injection. The reaction in the lighter cases may subside in six or eight hours, and in the severe cases seldom lasts more than forty-eight hours. The condition of the eye, after subsidence of the reaction is usually better than before the tuberculin was given. In no case has the eye been made worse in my experience. In some cases the local reaction is extremely slight, and in some cases of undoubted tuberculosis no local reaction can be detected.

It must be borne in mind that it is not impossible for tuberculosis and syphilis to exist in the individual at the same time; and that the one process may modify the other so that a nodular iritis or a disseminate choroiditis may be influenced by both diseases. The writer has seen two such cases affecting the iris. It is, therefore, desirable in many of the cases to make the diagnostic tests for syphilis as well as for tuberculosis; and in the cases in which both are positive to institute treatment for both at the same time. In fact it is the practice of the writer to give mercury and potassium iodid in moderate dose in very many of the cases in which tuberculosis of the eye exists, as well as to employ general tonic measures in the broad sense of the term. This brings us to the question as to what cases of eye lesions shall tuberculin be used?

#### LESIONS NOT TUBERCULOUS.

When the writing of this article first occurred to me it was my purpose to inquire whether tuberculins were of

any service in the treatment of any disease process other than those excited by the tubercle bacilli. This occurred to me because of the analogous use of diphtheria antitoxin which I found in 1913 was being employed in Glasgow by Dr. Maitland Ramsay in ulcer of the cornea of various kinds, and in some cases of phlyctenular keratitis, with alleged beneficial results; also that it was being used in one of the eye clinics of Vienna in similar affections of the eyes. The rationale for the practice was not very definite, but was based on the supposition that antibodies were introduced in the system which were antagonistic to the agents that were concerned in the production and continuation of the ulcers of the cornea and other eye affections in which it was used.

Although the results obtained by those who used the antitoxin were said to be very good in many of the cases, I have not considered it advisable to adopt the practice. In my reading of literature relating to the use of tuberculin I have not found mention of the use of this remedy for the treatment of any but tuberculous lesions. I raise this question in order to obtain an expression regarding it on the part of the members present. It is quite evident that tuberculin should be employed: (1st) In all cases of diseases of the eye and its adnexa in which a local reaction is excited by the subcutaneous introduction of test doses of tuberculin. (2nd) In those cases of suspected tuberculosis (a) in which a general reaction to tuberculin has been obtained; (b) in those cases of chronic affection of the eye in which a diagnosis is doubtful and in which therapeutic doses of tuberculin prove to be beneficial.

#### TUBERCULOUS AFFECTIONS.

Tubercular affections of the eye may be roughly classified, as follows:

*Lids:* Lupus vulgaris, and erythematosis, tuberculous thickening of the tarsus.

*Lacrimal apparatus:* Lupus of sac and canaliculi, conglomerate tubercle of the lacrimal gland.



*Conjunctiva:* Lupus vulgaris. Acute miliary tuberculosis following direct infection through a wound. Thickening of tarsus and overlying conjunctiva, more appreciable from the conjunctival surface. In tuberculosis of lids and conjunctiva the preauricular and cervical glands on the side affected are usually appreciably enlarged.

*Sclera and Cornea:* Tuberculosis of one of these parts of the fibrous tunic of the eye is seldom present without participation of the other, except in cases in which the sclera posterior to the equator is involved. The disease is marked by chronicity; the inflammation is of a low form, the changes characterized by the development of more or less distinct foci, which in the cornea are pale, frequently having a yellow tinge in the sclera, varying according to the degree of thickness and hyperemia of the tissue involved.

It seldom occurs that the entire anterior segment of the sclera is affected, or that the entire cornea is involved, and if this be the case, the degree of the process varies in different parts. An interstitial keratitis closely resembling that observed in syphilis may develop in the cornea, and a sclerosing effect may be produced. Some vascularity, usually superficially located, develops in the cornea. The affection of the anterior segment of the sclera is almost without exception an extension of a tuberculous process from the ciliary portion of the uveal tract.

*Phlyctenular Keratitis:* Numerous recent studies of this disease appear to show a relation between the subacute or chronic forms of phlyctenular keratitis and conjunctivitis, and tuberculosis. Tubercle bacilli have not been demonstrated in the lesions. But the occurrence of a positive systemic reaction to tuberculin in many of these cases, and the beneficial effect of tuberculin in some, suggests a strong interdependence between tuberculosis and these lesions.

*Iris:* Tuberculosis of the iris manifests itself in four quite distinct forms. The most common is the development of small yellowish gray nodules, scattered principally throughout the major zone

of the iris. These occur in children and young adults as a result of active tuberculosis in some other part of the body. In a high percentage of the cases both eyes are affected.

A second form is the conglomerate tubercle which develops slowly and is accompanied by little inflammatory reaction. It is monocular almost without exception. Third the tubercular granuloma occurring in children.

The three forms mentioned may be accompanied by the white floating "mutton-fat" exudation which is observed, so far as I am aware, only in tubercular affections of the eye.

A fourth form is an affection of the iris which leads to heterochromia and partial atrophy, and is apparently due to ptomain absorption rather than to the actual presence of the bacilli in the iris.

*Choroid:* This portion of the uveal tract may present the miliary or the conglomerate tubercle and the tuberculous granuloma. Also exudative and disseminate choroiditis of tubercular origin.

*Retina and Optic Nerve:* The recurring hemorrhages in adolescents are apparently tuberculous in origin in many of the cases, as suggested by Axenfeld and Stock in 1909. Some forms of retinal exudation are tubercular in origin. A papillo-retinitis with the development of conglomerate tubercles is also sometimes observed. This may be accompanied by quite extensive retinal detachment.

#### KINDS OF TUBERCULIN.

What kind of tuberculin can be used to best advantage in diagnosis and treatment?

Tuberculin "T. O." is a filtrate of tubercle bacilli culture grown on glycerin broth, concentrated by heat to one-tenth of its volume, and then filtered thru porcelain to remove the germs. "T. O." is subjected to a temperature of 60° to 90° C., depending on the laboratory in which it is produced. It "contains the soluble products of the tubercle bacillus in a 50 per cent glycerin solution. It is thought that valuable immunizing properties are lost by the heating process to which it is subjected."

Tuberculin T. R. is made by triturating dried tubercle bacilli into a fine pow-

der, treating the powder with a normal saline solution, and centrifuging. The suspension is thus separated into two layers, the upper layer containing the glycerin-soluble substances, the lower containing the substances left behind after extraction with glycerin. This latter constitutes T. R. Initial dose 1/5000 to 1/1000 mg.

Tuberculin B. E. (bacillus emulsion) is a suspension of one part of thoroughly triturated tubercle bacilli, in 100 parts of distilled water, to which equal parts of glycerin are added. Initial dose 1/5000 to 1/1000 mg.

Tuberculin B. F. (bouillon filtrate) (Denys) is a preparation similar to T. O., except that it is not concentrated by high degrees of temperature. Initial dose 1/10,000 to 1/1000 mg.

Tuberculin T. B. K. (Béraneck) consists of the extracellular toxins of the bouillon culture, together with intracellular toxins extracted from the bodies of the bacilli with 1 per cent phosphoric acid. Theoretically it should contain, as far as possible, all substances having immunizing properties, and avoid the danger common to the emulsions, of containing live bacilli. It is supplied in 15 different solutions, each one double the strength of the preceding one.

Tuberculins T. R. and B. E. are in a sense vaccines, and since they are not subjected to sufficient heat to kill living bacilli, may, (although the trituration is supposed to be sufficiently thoro to destroy all living germs) contain living germs and subject the patient to the danger of infection.

It is generally conceded that tuberculin "T. O." is best suited for use for diagnostic purposes. Other tuberculins can be employed, but the regulation of the dose, etc., has not been so definitely fixed and the results not so uniform. Consequently their employment is not so satisfactory.

For therapeutic purposes T. R. and B. E. are more largely favored, and T. B. K. (Béraneck) is preferred by some.

Although theoretically the tuberculins prepared without heat are superior, since their immunizing qualities are not supposed to be impaired, practically I have obtained fully as good, if

not better results from the use of old tuberculin, as supplied by the New York Board of Health, as from any other of the tuberculins; and in some of the cases at least the T. O. tuberculin has been superior. This has proven to be the case so often that I have now come to employ the old tuberculin in almost all cases as long as I see improvement. If improvement ceases I resort to the use of one of the other preparations—sometimes T. R., sometimes B. E. I have found the "B. E." as put up in soluble tablets to be fairly satisfactory, on account of the convenient form and its stability. In all cases when the tuberculin employed fails to improve the condition it is discontinued and another preparation substituted.

#### DOSE, PERIOD, RESULTS.

In what dose and for how long a period should tuberculin be employed in treating tuberculosis of the eye? It has been my practice to employ tuberculin for therapeutic purposes in a dose just short of sufficient to produce a systemic reaction, and to repeat the dose every four or five days. A systemic reaction may be produced by a very small dose. Stilwill (*Annals of Ophth.* V. 24, p. 413, 1915), reports a slight systemic reaction from an injection of T. R. 1/400,000 mg. and a strong reaction from an injection of 1/250,000 mg. The writer has employed T. O. in dose of 3 mg. in an undoubted case of tuberculosis, without inducing any appreciable constitutional effect. The range of susceptibility or of sensitiveness to tuberculins is very considerable.

In regard to the length of time over which treatment should be continued, I think that it can be fixed only approximately. Some relapses will occur in spite of most careful management. It is the writer's custom to continue the injections for at least two months, after all signs of activity of the tuberculous focus have subsided; and then to keep the patient under observation and to recommence treatment if any sign of relapse is discovered.

Von Hippel (*Graefe's Arch.* f.

Ophth. V. L. I. X. p. 1.) reports 243 cases of tuberculosis of the eye treated with tuberculin. Of these there were relapses in 32. The relapses were most frequent in tuberculosis of the uveal tract. Of 75 cases of tuberculo-

sis of the iris and ciliary body, relapses occurred in 15. In the writer's experience relapses in cases of tuberculosis affecting the uveal tract have been most frequent. Relapses in corneal tuberculosis were next in frequency.

## TUBERCULOMA OF THE IRIS: REPORT OF CASE WITH MICROSCOPIC EXAMINATION OF THE EYEBALL.

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NEW YORK.

This patient, under observation almost three years, died of intercurrent disease, giving opportunity for complete study of the pathologic conditions present.

Tuberculoma of the iris is not an uncommon condition; but it is rare to have the opportunity to report the pathologic findings, because most of the cases in the recent literature are cleared up under tuberculin treatment.

Tuberculoma of the iris occurs as disseminated tubercles; or as one solitary tubercle which resembles a neoplasm, and was first described by von Graefe as a granuloma, because Virchow, who made the examination, called it granulation tissue.

CASE.—Isabella H., a foundling, aged 3 weeks. She was admitted to the New York Foundling Hospital April 12th, 1915, and was placed in the feeding ward. Weight was 6 pounds 4 ounces. Wassermann blood test made as a routine was negative. She continued to improve in weight and on December 31st, 1915, was sent out boarding. Weight at this time was 13 pounds 8 ounces.

During January, 1916, she had eczema of the head and the body. It was reported that about this time she had a sore left eye, and enlarged fingers; but the exact eye conditions cannot be determined.

September, 1916, it was reported that she had measles, and that the eye condition was about the same. This must have been the German measles.

June, 1917, report states that her general condition was not as well, and that the eye was still sore.

October, 1917, she was admitted to the hospital, and the writer saw her for the first time. Examination as follows: Weight, 22 pounds; looks fairly well nourished; phalanges enlarged, due to increase in size of the bones. Left eye, photophobia and blepharospasm; little circumcorneal injection; pupil contracted; anterior chamber deep and a small yellowish white mass is observed in the lower outer quadrant between the posterior surface of the cornea and the iris. Atropin 1 per cent and yellow oxid of mercury 1 per cent were ordered. Another Wassermann blood test was negative. The atropin did not dilate the pupil because of the synechiae present. October 17th, 1917, a third Wassermann test was negative.

During the second half of October two von Pirquets were made, and were negative. A third was made in the early part of November which was mildly positive.

The child also had a dactylitis and it seemed fair to assume that the eye and finger lesions were similar in origin. The finger lesion had broken down and would discharge pus. It would close up only to break down again. X-ray examination of the hand was made. The report was that the lesion was probably tuberculosis, but other experts said it was syphilis. Then an X-ray examination of the chest was made with the idea of determining the



presence of tubercular lymph nodes. This was negative. There was in addition a lesion in the right vulva; a small tumor, skin over it discolored and at times a cheesy substance could be pressed out of it.

From October, 1917, to early in December, 1917, one grain salicylat of mercury injections were given twice a week, till 12 or 13 injections were given. After this 5 drops saturated solution potassium iodid three times a day for a period of one month. She took the mercury well and increased in weight; the eye condition remaining about the same. While taking the drops she lost her appetite and weight decreased. A fourth Wassermann blood test was made with the idea of its being a provocative one and this was also negative.

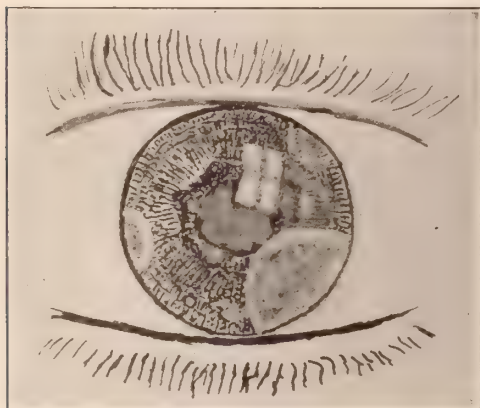


Fig. 1. Tuberculoma of the iris (Mulcahy's case).

January 11th, 1918, Dr. Martin Cohen and Dr. M. Uribe-Troncoso saw the patient with me and a very careful examination of the eye was made. The following notes were made at this time:

1. Infiltration of the cornea.
  - a. Over mass or tumor but smaller.
  - b. Over 2 o'clock and 9 o'clock were two small spots which looked as if there were daughter tubercles in the iris underneath them.
2. Aqueous clear.
3. Pupillary space covered over by a fibrous exudate.
4. Yellowish white mass, spherical in shape, size of a pea, surface regular, bor-

der sharply outlined, mass comes in contact with posterior surface of the cornea; few blood vessels on surface of the mass.

5. Fundi negative.

Right eye normal.

The general tuberculin reaction was suggested and now made. Two hour temperatures for two days were found to be normal, before the date of injection of one-quarter milligram of old tuberculin on January 23d, 1918, at 1 P. M.; and exactly at 1 P. M. January 24th, or 24 hours later, the maximum rise to 101 degrees was reached. During this time the child suffered from general malaise, and did not want to take food. Circumcorneal injection increased and there was more redness about the finger lesion. The temperature gradually returned to normal and the circumcorneal injection and the redness about the finger became less. A raised red area about the size of a dime appeared at the site of the injection 12 hours after, and increased to the size of a nickel. In the center of this area appeared a white spot.

On February 5th, 1918, the temperature having remained normal, tuberculin injections of the B. E. were begun. First dose of .00001 Feb. 5th; .00002 Feb. 7th; .00003 Feb. 11th. On Feb. 12th the temperature arose to 102 degrees so the injections were stopped because it was thought that the rise of temperature was due to the tuberculin injection.

The rise of temperature was caused by an attack of measles. There were a number of cases in the hospital at the time, but as it had been reported that the child already had measles it was not expected to have another attack. But it is probable that the first attack was the German measles. The attack was complicated with lobar pneumonia from which the child died on March 4th, 1918.

#### PATHOLOGIC FINDINGS.

Autopsy was made by Dr. C. A. McCarthy of the Visiting Staff of the hospital and the lesions found were double lobar pneumonia, many caseous bronchial lymph nodes and amyloid liver.

The left eye, one finger and lymph nodes were removed for pathologic study which was made by Dr. James Ewing of Cornell University Medical College. Report as follows: The main pathologic features in the material presented in this case are:

1. Advanced caseation of the bronchial lymph nodes.

2. A recent granulomatous and necrotic inflammation of the bone marrow and periosteum of one finger.

3. A recent and active granulomatous process in the iris.

1. The caseous process in the bronchial lymph node is a typical advanced tuberculous inflammation.

2. In the periosteum there is a subacute productive inflammation with many lymphocytes splitting up the layers of the periosteum and gathered in foci about the blood vessels. In the bone marrow there is a focus as large as a pea, which consists of lymphocytes, proliferating fat cells and some large cells, with central necrosis; but without giant cells. These changes are strongly indicative of tuberculosis.

3. In the iris and about the ciliary body there is a rich infiltration by lymphocytes, plasma cells, and proliferating blood vessels; and in the blood vessels and about them are many polynuclear leucocytes. At several points there are focal collections of lymphocytes. These changes are consistent with a tuberculous origin.

In view of the tuberculous character of the lymph node lesion, and the probable tuberculous nature of the osteomyelitis, there is strong ground for concluding that all the lesions are tuberculous.

The tubercle bacilli were looked for in the eye lesion but could not be demonstrated, by a competent bacteriologist.

COMMENT.—The value of the general tuberculin reaction was clearly demonstrated in this case. Before its use the diagnosis was for the most part

a mere guess of probably tuberculosis. After its use the diagnosis was without question tuberculosis. The reporter hesitated to make the general tuberculin reaction because of the age of the patient, less than three years at the time of use, but positively no harm was done.

The first and second von Pirquet's tests were negative and the third was slightly positive. In children this test is expected to be of the greatest value, but in this case one could say that it was an uncertainty. Perhaps this was so because the case was one of bone tuberculosis; and it may be as in bone syphilis, the Wassermann blood test is more apt to be negative than positive.

The fact that vigorous antisyphilitic treatment did not benefit the patient, and that the four Wassermann blood tests were negative ought to exclude any suspicion of syphilis.

VALUE OF THE X-RAY EXAMINATIONS. That of the hand showed characteristic single lesions on the plate, which if taken alone could be either syphilitic or tuberculous, in other words some of the bone lesions showed proliferation and others destruction. But the destructive lesions were more marked, hence the X-ray of the hand was clinically tuberculosis.

It is a well known fact that tuberculosis of the iris and ciliary body is always secondary to tuberculous bronchial lymph nodes. X-ray examination taken to determine the presence of bronchial lymph nodes was negative; and yet an autopsy, which was made about four months after the X-ray examination, showed many bronchial lymph nodes.

While the conglomerate tubercle was the most conspicuous lesion in the case, there were in addition two very small pin head spots in the iris which were daughter foci; and a general plastic iritis as evidenced by the posterior synechiae.

# TOWER SKULL WITH DOUBLE OPTIC NERVE ATROPHY

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Report of a case illustrated with photographs of the patient, and X-ray pictures of cranium and contents.

Anomalies in the development of the skull are very common and have been thoroughly studied by workers in this particular branch of pathology.

The tower skull oxycephaly, or "thurmschädel," as the Germans call it, is of special interest to us as ophthalmologists, owing to the frequent pathologic eye findings associated with this condition. Not that the ocular changes are found only in this particularly shaped head, or that ocular lesions are always found here, but this class of patients come to us as ophthalmologists for the eye affection; and we find this probably the most common deformity of the head. Again, it is quite probable that malformations of the head are more commonly the cause of eye lesions, than one is led to believe from the available literature. We find, for example, that up to 1912 only 26 cases of tower head had been reported. Enslin (1), who was looking for these cases over a period of two years, out of 9,380 eye patients found 16 cases of this kind. It is quite apparent that if we do not look for a special condition we do not find it, unless it is an extremely marked case, as in the one we present.

Tower skull, *per se* as the cause of eye disease, is still problematic, for we find a number of cases reported of this shaped head, without any eye lesions at the time of examination; of course it is quite possible that a transitory eye lesion might have been present, and had left no demonstrable evidence later in life when examination was made.

One could reason that this definite skull malformation must have some influence, for we find that in all the cases reported we have virtually one eye lesion and that an affection of the optic

nerve. In the 42 cases reported, 36 had a post neuritic atrophy, 2 with a double neuro-retinitis, 2 with one sided papillitis and post neuritic atrophy, and 2 cases with primary optic atrophy.

The question arises whether the tower skull is the direct or indirect cause of the optic nerve lesion. The theory propounded, that the casual factor responsible for the malformation of the skull is also the cause of the optic nerve lesion, has a number of adherents.

We find that maldevelopments of the skull are due to a premature ossification of the different sutures, and in this particular form the coronal suture is closed very early with compensatory development in height, which corresponds with Virchow's dictum, that the development or maldevelopment takes place vertically to the closed suture.

The probable cause of the premature ossification of this suture, the time of onset, whether intra- or extrauterine, is very interesting and much can be said, but we shall only state, at this time, those essentials that might be associated with the eye lesions.

In a number of the cases reported, and in the one we are presenting, we are inclined to believe that this process began during the prenatal period.

That an osteitis is present, and is the probable cause of the premature ossification of the sutures, nearly every one is agreed upon. The etiology of osteitis, at least in adult life, is infection of some character. That a metastatic infection during intrauterine life is possible there is no doubt and is not strange to ophthalmology.

The theory of excessive nutrition of the bones possibly brought about by a passive hyperemia, as propounded by



Bier and referred to by obstetricians under the caption of abnormal positions or flexions of the fetus, must also be given some consideration.

Michel (2) states that he is inclined to think that the change in the growth of bone is due to an increased process of nutrition.

We have, then, an osteitis, whatever the cause of this may be, and an osteitis is invariably associated with a periostitis, the dura here acting as a periosteum; it is reasonable to assume that this process extends to the optic foramen, thus decreasing the caliber of this opening, and in this way producing a papillitis. This has been found to be true in two cases reported that came to the post-mortem table. Ponfick (3) in 1886 reports such a case. Manz (4) also reports a similar case in 1885.

Enslin working upon this theory visited the anatomic museums at Heidelberg and Breslau and found six such skulls, but could discover no constriction of the optic foramina; he, however, states that this does not entirely detract from this theory, as the skulls he examined were very old and very dry.

Hirschberg (5) is inclined to think that the cranial deformity and the eye disease are often to be referred to the same cause, namely an inflammation of the dura and the bone.

Virchow (6), who examined a number of Hirschberg's cases, concurs in this view.

The factor of hydrocephalus, internal or external, as the cause of the eye lesion per se, is of considerable importance. Whether this is a transitory form as suggested by Friedenwald (7) or the result of premature ossification of the sutures remains an open question. The literature on this phase is not as extensive as on the previously mentioned theories. The case presented here is of more than passing interest, in that we to our knowledge apparently have the advantage not possessed by earlier observers in our Roentgenographs.

The history in our case plus the X-Ray plates will, we believe, throw some light on this obscure subject.

CASE.—The family history as far as we could ascertain is apparently negative, on both sides of the family tree. The mother of our patient has two additional children living, and as far as one can see they are perfectly normal. The photograph shows an older sister. One child died of a valvular lesion.

The mother states that all her labours were normal, but that she had some difficulty with our subject. The attending physician had found the head rather long, but succeeded in delivering her without the use of instruments.



Fig. 1. Tower skull. (Goldenburg's case), with older sister.

When the child was born it had many soft spots on the top of the head, particularly in the center, where the mother says there was noted a marked thumping. The front part of the head was hard. Both the veins and arteries over the temples were very prominent and a marked pulsation was present, particularly so upon the left side. There seemed to be a large hard protrusion somewhat above and back of the left ear.

Physicians who saw the case at that time thought the child had been delivered by instruments. The child had great difficulty in nursing and breathing at the same time; and even when

not nursing, breathing sounded as if she were choking. The attending physician was inclined to think that there was a growth in the nose, but nothing



Fig. 2. Goldenburg's patient showing prominent eye-balls and divergent squint.

was attempted in this direction. The attending physician's opinion in regard to her head at this time was that she had water on the brain.

As regards the eyes, they were very prominent and the child did not seem to show evidence of being able to see very much, as far as the mother can remember. The child had no lesions of any kind on the skin and was apparently otherwise normal. When four months of age she developed a rash on the left cheek and later also on the right cheek, but this rash soon disappeared.

At the present time we have the tower skull with a bitemporal circumference of  $17\frac{3}{4}$  inches. A sagittal measurement of  $14\frac{3}{4}$  from nasion to occipital protuberance. Perpendicular from nasion to highest point of the skull of  $5\frac{1}{2}$  inches and an anterior posterior diameter of  $5\frac{1}{2}$  inches.

The eyes are very prominent, but it is questionable whether this condition can be called a true exophthalmos. The eyeballs are very large and the sclera thin. The cornea normal in size, trans-

parency, and sheen. We have a divergent strabismus with a marked horizontal nystagmus.

Anterior chamber and iris are negative. The pupillary opening is about 6 mm. and equal in both eyes and reacts very sluggishly to bright light. Tension negative. Vision in R eye—Nil. Retinoscopy R—5.00 in both meridians with no improvement in vision.

L.  $4/200$ — $6.5$  C— $3.5$  cy. ax.  $150 = 8/200$ .

FUNDI.—Disks a dirty gray and outlines not well defined; there is an uncertainty as to the caliber of the vessels, owing to the marked nystagmus, but we are inclined to think that there is some evidence of a perivascularitis. Direct ophthalmoscopy was very difficult and unsatisfactory.

NOSE.—Vestibule of nose negative. Septum appears as if it had been pressed down upon and lies spread over the floor of the inferior meatus, while there is a pronounced deviation high up.

There is a wrinkling of the skin around the mouth, with no evidence of scars, a similar wrinkling of skin, but very much more marked and almost



Fig. 3. Side view showing peculiar shape of skull.

black, as if dirt had been ground into it, is noted over the abdomen, axillae and on legs, which was pronounced by a







ANTERO-POSTERIOR ROENTGENOGRAPH OF GOLDENBURG'S CASE OF TOWER SKULL, SHOWING FORM OF SKULL AND IRREGULARITIES OF TEETH



ROENTGENOGRAPH OF GOLDENBURG'S CASE OF TOWER SKULL, LATEREL EXPOSURE, SHOWING FORM OF SKULL, IRREGULAR THINNINGS AND GROOVE OF MENINGEAL ARTERY





dermatologist as an ichthyosis with an abnormal distribution.

The teeth are in bad condition and the alveolar process of the superior maxilla is very thick; the hard palate is very high and the greatest distance between the base of arch is  $5/16$  of an inch. The soft palate is very long, but otherwise negative. Inferior maxilla negative.

EARS.—Externally negative; drums—absence of sheen and slightly retracted. Hearing very acute both for low and high tones, a rather remarkable feature is that the bone conduction is as great and some times greater than the air conduction.

General health good; her only complaint is that of a little pain over eyebrows, especially in cold weather.

Mentally, when one takes into consideration the vision and lack of education, we can say she is quite bright. Plays the piano.

Our roentgenographs show the skull to be very irregular in thickness with numerous depressions on the inner table undoubtedly formed by the convolutions of the brain. Suture lines were not demonstrable; and the grooves of the meningeal vessels or diploic veins were markedly accentuated. The sella turcica was approximately normal in size. No evidence of pathology responsible for the exophthalmos. The roentgenographer further states there is premature ossification of the sutures leading to a con-

dition known as internal hydrocephalus, and the increased intracranial pressure is responsible for the peculiar markings on the inner table.

Owing to the peculiar facies we were inclined to think of congenital lues, but this had to be excluded by the family history, clinical and serologic findings. Urinalysis negative. Tuberculin tests were not made.

It seems to us that this case is well worthy of presentation for several reasons. The apparent evidence of the disease during the prenatal period. The fact that 75% of these cases are seen in the male, and by far the largest percentage of total or partial blindness occurs in the male. Most of the cases are not recognized until long after birth, when the patient usually comes in for some other condition, or his or her failure to pass some eye examination. When a post neuritic atrophy or a primary atrophy is found, and the thought suggests itself to us, that possibly some of the so called amaurotic eyes could be explained upon these grounds.

According to von Graefe, the atrophy following a neuritis can for a long time be recognized as such, but not forever, as later it cannot be differentiated from a primary atrophy.

The fields are as a rule the same as in papillitis, i. e., concentric contraction. Where vision was good there was found no enlargement of the blind spot.

#### REFERENCES.

- I. Enslin, Virchows Archives, Vol. 58, 1910.
- II. Michel, Archiv d. Heilk, 1873.
- III. Ponfick, Breslauer Ärtzl., Zeitschrift, 1886, No. 21.
- IV. Manz, Bericht über d. XIX, Ophthalm Versammlung Heidelberg, 1887.
- V. Hirschberg, Centralblatt f., p. Angenheilk, 1883-85.
- VI. Graefe, quoting Virchow A., v. Graefe's Arch, f. Ophthalm, 1866.
- VII. Friedenwald, Archives of Ophthalm, 1901,

# THE INERTIA OF ADJUSTMENT OF THE EYE FOR CLEAR SEEING AT DIFFERENT DISTANCES.

A Study of Ocular Functions with Special Reference to Aviation

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This is a study of the time required to adjust the eye for clear seeing at different distances. The article contains a description of the apparatus and method used in making the determinations and a statement of the results obtained under certain selected conditions. Other types of ocular lag are also considered briefly in passing and points bearing on the application of the method to the selection of aviators, to the work of the clinic, etc., are discussed.

Read at the Fifty-fourth Annual Meeting of the American Ophthalmological Society, July 10, 1918.

By inertia of adjustment is meant here the lag in the action of the extrinsic and intrinsic muscles in adjusting for clear seeing at different distances. The amount of lag in this function is found to vary a great deal from individual to individual. In the results to be presented, the minimum time required to change from the adjustment for clear seeing at or near the near-point to that for clear seeing at 6 meters, and the converse, has been measured in several cases.

So far the investigation has been conducted primarily as a study of the method, with special reference to its applicability as a test of fitness for vocations for which speed and accuracy of adjustment are a prerequisite. In this particular especially, the writers believe that the aviator must excel. The rapid development of the science and art of aviation, brought about by the present war, emphasizes the need for tests which will facilitate the selection of the supernormal eye. It is scarcely to be expected that the conventional clinic tests, designed more particularly for the separation of the subnormal from the normal eye, are fully adequate for this purpose.

It will be obvious, without discussion perhaps, that in estimating the fitness of an instrument, apparatus, or human organ for a particular task, or for the range of work which it may be called upon to perform, other aspects besides maximum power or capacity of response should be taken into account. Some of these are lag, steadiness or stability of response, power to sustain response, rate of fatigue or decay of response, rate of recovery, etc. All these functional aspects are present in particular in case of the eye, and their variation from time to time in

a given eye and from eye to eye can be measured with a degree of precision that is adequate at least for many comparative purposes.

As has already been indicated, we have been concerned in the present work with only one of these aspects, namely, the *lag* in the eye's reactions to its stimulus. In the study of this phenomenon at different times in our laboratory, three subdivisions have been made: the lag in the response of the retina to colored and colorless light, and its change with change in the intensity of light; the lag in the adjustment of the eye for clear seeing at different distances, and the lag in the development of the perception of depth or distance. The relation of all these to the functional efficiency of the eye will be considered very briefly in passing.

## LAG IN RESPONSE OF RETINA.

Because of its small order of magnitude, the first of these types of lag is of comparatively little importance in most of the uses to which the eye is put. In all acts of seeing, for example, in which a change of adjustment is required, the lag in the retina's action is insignificant in amount, as compared with the lag in the muscular action. It becomes of importance only in such uses of the eye as permit of a very short exposure to its stimulus, usually with the muscular adjustment already made, or in cases in which it is important to have the maximum response of which the eye is capable.

Examples of the former may be found in various uses of the eye in the technical work of the laboratory; and of the latter in signaling with colored and colorless lights. In order to show something of

the order of magnitude of the lag in the retina's response and its variation with the wave-length and intensity of light used, we have constructed curves in which the sensation as it rises to its maximum value is plotted in just noticeably different steps against time of exposure. These results were obtained in our laboratory three years ago, in a comparative study of methods of determining lag.

We are indebted for them to M. A. Bills, a former graduate student.

Four of the most promising of the older methods and three new ones were used in making the determinations, and the results of these methods were checked against each other. The comparative study was made thruout on the same observers.

The dominant motive in making this study was to find or devise a method which would have sureness of principle and precision, and at the same time the feasibility that is needed for practical applications. One of the new methods was found to answer surprisingly well to these requirements, considering the nature and difficulty of the problem. The lights employed were narrow bands in the red,  $686\mu\mu$ ; yellow,  $588\mu\mu$ ; green,  $511\mu\mu$ ; and blue,  $463\mu\mu$ ; and white light. The colored lights were taken from the prismatic spectrum of a Nernst filament, and the white was synthesized from this spectrum. The lights were all made photometrically equal; and, in addition, for the sake of more absolute specification, their physical intensities were measured by means of a thermopile.

The results obtained showed that observers differ in all the following regards: Amount of lag for a given stimulus, the amount of difference in the lag for the different wave-lengths and for white light, and the effect on these differences of changing the intensity of light. Three intensities of light were used, 0.057, 0.151, and 1.21 meter-candles. For the lowest of these intensities the rate of rise to the maximum was in the following order: Yellow, red, blue, green, and white, the time of the maximum ranging between 0.1 and 0.22 sec.

For the highest intensity the rates of rise were in this order: Green, yellow, white, and red,—the time required to

reach the maximum ranging between 0.085 and 0.14 sec. Blue was omitted from this series because it could not be obtained at the required photometric value with the apparatus used. At the intermediate intensity, a transition condition is shown. In passing over a certain range, low in the intensity scale, to points higher in the scale, there is a radical change in the order of rate of rise, tending toward a complete reversal at high intensities; while at intermediate points in the scale the lag is shown to be in a state of transition between what is present at low and at high intensities. An increase in intensity is found also to lessen the lag very considerably or to increase the rate of rise.

These details, however, are much more important in certain phases of the use of the eye in laboratory technic, for example, than they are in immediate relation to the work of the present paper. Our purpose in introducing them here is, as we have already indicated, merely to give some general idea of this feature in the eye's slowness in responding to its task, and in particular to show that, as compared with the inertia of adjusting clearly to receive its impression, the inertia in its sensory reaction is relatively unimportant for most of the work which it is called upon to do.

#### LAG IN DEPTH PERCEPTION IN STEREOSCOPIC VISION.

So far our investigation of the lag in the perception of depth has been made in stereoscopic vision, and for an entirely different purpose than the grading of individual capacities. The results show, however, that depth comes into the percept later than height and breadth and color and brightness, and that the amount of lag varies for different observers. Whether this type of lag could be made a feasible basis for the grading of individuals for vocational purposes we are not prepared at this time to say. Speed and accuracy in judging distance are doubtless important items in the qualification of an aviator, for example; and it may be possible to work out feasible tests for certain fundamental aspects of the ocular foundation of this ability.

Indeed the lag in the adjustment of the eye for clear seeing at different dis-



tances should sustain a somewhat fundamental relation to speed of judging distance, since both the adjustment of the eye and the clear seeing of objects are in general the important ocular functions involved in the judgment of distance. Unfortunately for our purpose, however, the judgment itself is not an ocular function. The eye provides only the criteria,—and a very complex set of criteria at that—from which the individual learns by experience to form his judgment of distance.

The testing of these extraocular capacities, the ability to estimate distance, more especially under an entirely new set of conditions for which definite standards or patterns are wanting, is perhaps just as important as the testing of the ocular capacity itself. The testing of the ocular capacity, as registered in certain simple space judgments, with or without the element of time, or speed of performance, is capable of definite treatment. All that can be said of the remainder of the problem is that it is open to investigation.

#### LAG IN ADJUSTMENTS FOR DISTANCE.

On quite a different methodologic plane, however, is the determination of the lag in the adjustment of the eye for clear seeing at different distances. The making of these determinations by the method we have used involves no extraocular capacities of a higher order than are required in the acuity tests for illiterates. Moreover, a direct objective check is applied to the subjective judgment. That is, the letter E, built to scale and turned in different directions, is used as a test-object for the different distances, and the observer is required only to indicate the direction in which the letter points in any given case. Such testing of human functions, even without the objective check, is, so far as method and principles of testing are concerned, just as definite as the testing of those physical instruments, the responses of which must be read by the eye from a moving pointer and scale or their equivalent.

Our purpose in making these tests has been, as we have already indicated, primarily to ascertain whether eyes, rated by the clinic tests as normal or approxi-

mately so, can not be more finely graded as to their working efficiency or fitness for special purposes, when other important functions than those considered in the clinic tests are taken into account. For this purpose we have aimed, therefore, to test for the greater part only eyes that have been passed in the clinic as normal, or as having defects so insignificant as not to need correction. Ninety-four percent of the eyes of this group were able to read quite readily at 6 meters under 5.2 foot-candles of light, the test type designed to be read at 4 meters; and the remaining 6 percent, the type designed to be read at 5 meters. In addition a few were tested whose eyes were corrected by glasses.

This was done for the purpose of getting results comparative of the performance of eyes corrected to standard according to the norms of the clinic, and the uncorrected normal eye. All but one of the uncorrected group were between 18 and 28 years of age, and only one of the corrected group was over 28. Three of the observers had worked pretty steadily for a year or more with high-power microscopes, four were trained in the observations of physiologic optics, and the remainder were selected at random from the college community. The best results were obtained from one of the three who had been trained in the use of a high-power microscope, but her results were closely rivaled by those of a college sophomore whose eyes and observational powers had received no special training. However, the results of the three whose eyes had received special training in the use of the high-power microscope averaged rather strikingly high. To what extent speed of adjustment can be trained is yet to be determined.

Fortunately for the feasibility of the test, the immediate practice effect is low; or, more properly speaking, it is rather high in the initial observations, but soon ceases to be troublesome. Also the precision for any given set of determinations is high. As might be expected, though, there is a diurnal variation in the results corresponding to the diurnal changes in the function tested. The maximum range

of these variations, however, is small, as compared with the range of variation between individuals. It is not great enough, so far as we have thus far been able to determine, seriously to affect the grading of eyes with sufficient precision for practical purposes on the basis of the tests taken at any one time chosen at random. The fact that there is a diurnal variation suggests, however, that if the test be used as a check on fitness for aviation, it might be of advantage to determine each individual's norm and require a short test before each flight, or as often as may be needed to keep track of the variations and to safeguard against the more serious depressions that may occur.<sup>1</sup>

The working distance for the far object was chosen at 6 meters and for the near object as 18 cm. The far object at this distance subtended a visual angle of 7 min.; the near object, 14.8 min. In choosing both the working distance and the visual angle for the

[1. If a check is wanted on the diurnal variations in other motor coördinations, as well as those of the eye, a reaction experiment involving choice may readily be combined with the ocular experiment. Two forms of this reaction experiment are suggested:

(1) A four-finger reaction key may be used, each of the keys to indicate one of the four possible positions of the letters—up, down, right, and left. That is, the observer, just as soon as each letter—near, far, and near—is discriminated, indicates the direction in which it points by pressing the proper key. (2) A wider range of coördinative ability could be tested by having two keys operated respectively by the right and left hand, and contacts by the right and left foot. By soldering contacts on each edge of the exposure discs in circuit with an electromagnetic marker, and by having the reaction keys and foot contacts also in circuit with electromagnetic markers, the length of exposure for each test-object and the reaction times could all be recorded simultaneously on a kymograph, together with a time line traced by an electric tuning fork. With these records as a check on the quickness of the motor functions of eye, arms, and legs, and the mental functions involved in choosing, it would seem scarcely possible that the aviator could grow stale or suffer even temporary depressions of any consequence without the knowledge of the laboratory corps. Also, from the accumulated records a comparative rating of the stability of the men could be made. It may be, of course, that the eye records alone will serve as a reliable index of the variations in the observer's general condition, but that correlation has not as yet been investigated.]

near objects, care was taken not to approach too closely to the limiting values. This was needed to safeguard the results against individual differences in the nearpoint and in acuity. That is, it was found that unless these limiting values were too closely approximated, small variations either in the visual angle or in the working distance produced little difference in the results.

Since our problem was in part to devise and try out apparatus, the determinations have been made with two types of apparatus, one of which is slightly simpler in construction and use than the other. By means of the more complicated apparatus, however, a more complete analysis of the problem is possible. That is, by means of the simpler apparatus it is possible to make the following determinations: the lag of perception with the eye in approximate adjustment for the near object, the time required to change from this adjustment to that required for far seeing, and the time required for the double excursion, *i. e.*, from near to far and back again to near; while by means of the other apparatus we were in addition able to break up the double excursion into its two halves, the time required to pass from near to far and back again to near. By means of the second apparatus, moreover, all the determinations may be made in a single swing of the compound pendulum governing the time of exposure.

There is another advantage of the second apparatus which came out quite plainly whenever a comparison of results was possible on the same observer. That is, in its use a provision was made to cut off the test-object just as soon as it was discriminated. The eye was not allowed to linger on the far object, as was its tendency when the double excursion was not broken up into its two halves. The value of the double excursion, as determined directly by the first apparatus was, for example, appreciably longer than when it was determined by adding together the values of the two halves as determined by the second apparatus. This tendency of the eye to linger where it can, thus not only makes a difference



in the absolute value of the results, but there is a danger that it may affect also the comparative values. That is, the latitude offered not only gives a chance for a variable performance or a variable error from time to time with the same observer, but it leaves the results open to the influence of this factor in case of different observers.

Obviously the test may be used in two ways: (1) Records may be made of the maximum performance of each individual. This would be the analog of making acuity tests in terms of the minimum visual angle each observer is able to discriminate. This procedure is the longer of the two, but results in a much finer grading of performance. (2) Two, three, four, or

ent work had been done by the former to establish the required norms for the vocation or purpose in question. Results obtained with the two types of apparatus are shown in Table I and II. For the greater part of the results given in Table I we are indebted to M. Almack, a graduate student in our laboratory.

A graphic representation of these results is given in Figure I.

Since these tables are somewhat detailed, it may be of advantage to give in advance a few points by way of a very general statement of results. The time required for the 18 normal observers to pass from near to far varied between 0.50 and 1.16 sec., a range of 132 percent; from far to near, between 0.39 and 0.82 sec., a range of 110.3 percent; and from near to far and back to near, between 0.96 and 1.76 sec., a range of 83.3 percent. Of these observers, 83 1-3 percent required longer to change from near to far than from far to near. The longer time to pass from near to far may to some extent, of course, have been due to the smaller visual angle subtended by the far object. That is, the time required to discriminate the far object may have been increased by its relatively smaller angular value.

If a rough classification by rank were wanted, they might readily be divided into three or more groups, with abundance of difference between groups for a graded setting of the apparatus. If, for example, three groups are chosen,—fast, medium and slow,—fast ranging between 0.96 and 1.25 sec., medium between 1.25 and 1.55 sec., and slow between 1.55 and 1.85 sec.,—28 per cent would fall in the first class, 55 percent in the second class, and 17 percent in the third class. The observers who wore glasses all group together with the slowest of the normal class. The time from near to far for these observers ranged between 0.89 and 1.17 sec.; from far to near, between 0.41 and 0.68 sec.; and the time for the double excursion, between 1.48 and 1.58 sec. The fastest of this group was 54.2 percent slower for the round trip than the quickest of the normal group.

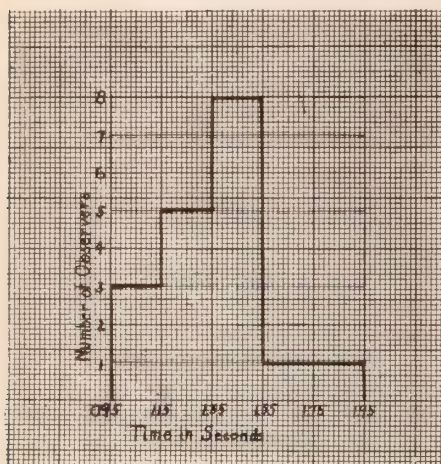


Fig. 1. Representing the relative distribution of eighteen observers graded with reference to speed of adjustment for clear seeing at different distances.

any suitable number of levels of performance may be chosen, and the apparatus set at once to give these levels. This method of testing would roughly place individuals into ranks or groups and is the analog of the Snellen method of grading acuity. It is a much quicker procedure but the grading made is correspondingly rough.

By this method the ranking or testing of a given individual by a practiced person should occupy but a few minutes. The results given in this paper were obtained entirely by the former method. It is obvious that the latter method could not be used until suffi-



TABLE I.

Showing the inertia of adjustment of the eye for clear seeing at different distances.

Observers with normal eyes—Apparatus I.															
Observer	Age	Degree Values		Time Values (Sec.)				Individual differences				Supplementary data			
		Near object	Near to far	Near to far and back to near	Near object	Near to far	Near to far and back to near	Near to far		Near point (cm.)	Refraction	Muscles			
								Deviation from quickest	Acuity						
													Sec. Percent	Sec. Percent	
Sl	25	1	31	64	0.02	0.50	0.96	...	...	...	O. D. : 6/4	11.5	Emmetropic	1 Exo	
Fl	26	1	42	73	0.02	0.68	1.05	0.18	36.0	0.09	9.4	O. S. : 6/4	12.5	+ .12 cyl. ax 90°	
St	23	1	38	85	0.02	0.64	1.17	0.14	28.0	0.21	21.9	O. D. : 6/4	12.5	+ .50 S. + .25 cyl. ax 0°	
C	25	1	44	103	0.02	0.72	1.37	0.22	44.0	0.41	42.7	O. S. : 6/4	10.4	+ .62 S.	2 2/3 Eso, 1/3 LH
Mc	27	1	53	105	0.02	0.77	1.41	0.27	54.0	0.45	46.9	O. D. : 6/4	11.3	+ .25 S. + .25 cyl. ax 75°	2 1/2 Eso, 1 RH
Ln	26	1	39	105	0.02	0.65	1.41	0.15	30.0	0.45	46.9	O. S. : 6/4	12.5	+ .25 S. + .12 cyl. ax 90°	2 Exo, 1 RH
F	40	2	54	124	0.04	0.775	1.85*	0.275	55.0	0.89	92.7	O. D. : 6/4	11.5	— .25 cyl. ax 80°	1 Eso
												O. S. : 6/5	10.5	Emmetropic	1 1/4 Eso, 1 RH
												O. D. : 6/4	15.0	+ .12 cyl. ax 120°	3 Eso
												O. S. : 6/4	15.0	+ .12 cyl. ax 15°	

\*Compare this result with that obtained with the same observer with Apparatus II. It will be remembered that we have stated (p. 767) that a longer time was required for the double excursion with the first apparatus than with the second in all cases in which the determinations were made on the same observer, owing to the tendency of the eye to linger on the far object when no provision was made to cut it off just as soon as it was discriminated.

TABLE II. OBSERVERS WITH NORMAL EYES, APPARATUS II.

Observer	Degree Values				Time Values (Sec.)				Individual differences: Deviation from quickest.						Near point (cm.)	Refraction	Muscles
	Age	Near object	Near to far	Far to near	Near to far	Near to near	Far to far	Far to near	Near to far	Near to near	Far to far	Far to near	Near to far	Near to near			
H	19	1	48	44	92	0.02	0.63	0.39	1.02	...	...	...	...	...	...	...	1 1/2 Eso. Add: Abd = 20:9
Lz	25	1	58	48	104	0.02	0.75	0.42	1.17	0.12	19.0	0.03	7.7	0.15	14.7	3 Eso, 1 RH Add: Abd = 26:5	
Bk	25	1	59	55	114	0.02	0.77	0.47	1.24	0.14	22.2	0.08	20.5	0.22	21.6	1/2 RH Add: Abd = 22:11	
L	19	2	59	64	123	0.04	0.76	0.565	1.325	0.13	20.6	0.175	44.9	0.305	29.9	1 Exo Add: Abd = 10:8	
Rg	28	1	55	70	125	0.02	0.715	0.61	1.33	0.085	13.5	0.22	56.4	0.31	30.4	1 1/2 Eso	
Ty	24	1	55	87	145	0.02	0.69	0.76	1.45	0.06	9.5	0.37	94.9	0.43	42.2	1 Exo Add: Abd = 22:7	
D	22	1	51	63	114*	0.02	0.825	0.675	1.50	0.195	31.0	0.285	73.1	0.48	47.1	3/4 Eso Add: Abd = 18:5	
S	24	2	68	75	143	0.045	0.85	0.66	1.51	0.22	34.9	0.27	69.2	0.49	48.0	1 Eso Add: Abd = 14:8	
F	40	1	64	81	145	0.02	0.79	0.73	1.52	0.16	25.4	0.34	87.2	0.50	49.0	3 Eso Add: Abd = 12:3 3/4	
B	19	1	56	92	149	0.02	0.705	0.82	1.525	0.075	11.9	0.43	110.3	0.505	49.5	1 Eso, 1 1/2 RH Add: Abd = 20:10	
M	18	1	79	70	149	0.02	0.94	0.635	1.575	0.31	49.2	0.245	62.8	0.555	54.4	1 Exo Add: Abd = 14:9	
Rs	24	2	98	60	158*	0.06	1.16	0.60	1.76	0.53	84.1	0.21	53.8	0.74	72.5	4 LH Add: Abd = 14:9	
With glasses—Apparatus II.																	
W	25	3	77	42	119*	0.09	1.02	0.46	1.48	0.39	61.9	0.07	17.9	0.46	45.1	1 1/2 Eso Add: Abd = 20:9	
Bt	27	2	63	75	138*	0.04	0.89	0.68	1.57	0.26	41.3	0.29	74.4	0.55	53.9	Ortho Add: Abd = 20:9	
H	31	1	105	43	148	0.02	1.17	0.405	1.575	0.54	85.7	0.015	3.8	0.555	54.4	1/4 Exo, 1/2 RH Add: Abd = 24:8	
Hk	27	1	82	62	144	0.02	1.015	0.565	1.58	0.385	61.1	0.175	44.9	0.56	54.9	3/4 Eso, 1/2 RH Add: Abd = 21:9	

<sup>1</sup>In the four cases marked with an asterisk, longer exposures were needed than could be gotten by changing the setting of the discs with a given position of the weights on the bar. The range of exposure needed was secured by changing the positions of the weights on the bar.

Under the age of 30, there seems to be no correlation in either group with the age of the observer.

So far but comparatively few observers have been tested above 30 years of age. The few that have been tested have averaged among the slowest of the normal group. We hope later to make a systematic study of the effect of age on speed of adjustment. In the present study our special purpose has been merely to find out whether individual differences of considerable magnitude are present well below the limit at which the influence of age might reasonably be expected to become effective.

There is a possible bearing of the principles of the test on the work of the clinic which perhaps should not be ignored. That is, in the conventional acuity test accuracy alone is taken into account. No provision is made in the form of the test to include speed of performance. When speed is added to accuracy as a requirement, a degree of sensitivity is given to the test which enables a much finer grading of the resolving power of the eye to be made. For example, two eyes which discriminate detail within the same visual angle can not be said to have the same acuity unless the task can be performed in the same or very nearly the same length of time; yet both might be given the same rating by the conventional test of acuity, so far as any safeguarding provision to the contrary is concerned.

Indeed, when speed is made a feature of the test, differences are picked up which would be passed over entirely by the clinic test. Such a refinement of the test need not be especially cumbersome when properly applied to the needs of the practitioner, and might, it would be reasonable to suppose, be utilized to advantage as a means of making a more precise diagnosis and in checking up and deciding between corrections, at least in certain difficult and troublesome cases.

From the beginning of our work with short exposures, results were obtained which may have some interest in relation to testing for astigmatism.

For example, it was found that in certain cases there was a more favorable meridian for the quick discrimination of the test object. That is, when turned into this meridian, a shorter time of exposure was needed to give the judgment required, and small deviations on either side increased the time needed to make the discrimination. In case of my own eyes, for example, a difference in result amounting to 40 per cent was found for this meridian and the meridian at right angles to it. A deviation of 5 degrees either way from this most favorable meridian gave a difference in result amounting to 175 percent.

The astigmatism was so slight that it could not be detected on the astigmatic chart. It was located by means of the ophthalmometer. A  $+12$  cylinder served to make the time record equal for the two meridians and to eliminate the astigmatic showing by the ophthalmometer. On further study of several cases the test was shown to possess a pronounced sensitivity to astigmatism, even without any additional or special modification better to meet the requirements of that particular application. Some of the results of this study are shown in Table III.

The requirements of the apparatus needed to make the foregoing determinations are comparatively simple. Some means must be provided for giving the exposures to the near and far test-objects, which will immediately succeed each other in the required order, and which can be varied by very small amounts and be repeated with precision. The first of the above requirements can best be met by making the successive exposures all a part of the same system of motion. The simplest way in which all the requirements mentioned can be satisfied is perhaps to have the exposures made by a set of light weight discs, of variable open and closed sectors, turned by means of a bar fastened at its center to the axle to which the discs are attached, and provided with adjustable weights on both arms.

Such a system operates as a compound pendulum and has all the char-



TABLE III.

Showing a comparison of the time required to discriminate the far object in the most favorable meridian and the meridian 90 degrees from this in cases of low astigmatism—also the difference in the time required for the most favorable meridian and for meridians 5 degrees on either side.

Ob- server *	Refraction	Time of discrimi- nation of far ob- ject in seconds At 90° removed from		Difference for two meridians		Difference pro- duced by a change of 5° in either direction	
		Most fa- vorable meridian	most fa- vorable meridian	Seconds	Percent.	Seconds	Percent
R (O. S.)	— .25 cyl. ax 5°	0.70	0.95	0.25	35.71	0.09	12.86
R (O. D.)	— .37 cyl. ax 150°	0.96	1.40	0.44	45.83	...	...
F	+ .12 cyl. ax 120°	0.80	1.12	0.32	40.00	0.14	17.50
B	— .25 cyl. ax 150°	0.65	1.02	0.37	56.92	0.06	9.23
T	— 1.25 cyl. ax 170°	0.55	0.84	0.29	52.73	0.12	21.82
L	— .25 cyl ax 5°	0.76	0.88	0.12	15.79	...	....

1. Before the lag records are made it is recommended, of course, that astigmatism be corrected. However, even if they are not corrected, low astigmatisms will give little trouble unless the defect is in the same meridian in both eyes. There will then be more and less favorable meridians for the quick discrimination of the test-object. The difficulty can be overcome fairly well, however, and the record be made without serious injustice to the ranking of the observer by avoiding turning the test object into the most and least favorable meridians.

acteristics and constancy of motion of a compound pendulum. The length of exposure can be varied either by changing the width of the open sector or the position of the weights on the arms. By utilizing both of these variables to their fullest extent, changes can readily be made of the order of thousandths of a second or even less, and a total range of exposure can be given varying from these values up to several seconds. All our work was done, for example, by adjusting the position of the weights on the arms to give a slow rate of turning and changing the values of the open sectors. Constancy of rate of turning, and therefore constancy of length of exposure, with a given value of open sector and a given position of weights on the bar, was secured by always releasing the bar at the same point in the arc through which it makes its swing. On the back of each set of discs is a protractor or graduated circle by means of which the values of the open sectors can be read to degrees or fractions of degrees. These values in degrees for any number of observers or observations, if the discs are made of sufficient-

ly light material, can be converted into units of time by a single process of calibration which will be described later.

In Fig. 2 is shown the first or simpler apparatus. The exposure discs, A, B, C, and D, are cut from hard sheet aluminum, No. 20 B. & S. gauge. Each of these discs is cut as shown at X in the figure, the inner portion, radius 6.5 cm., solid; the outer portion open to a value of 172°. The breadth of this outer zone for discs A and B is 14.5 cm.; and for discs C and D, 22.5 cm. The difference in the breadth of these two sets of discs has to be such that the smaller will just cover one of the near test-objects, and the larger the other, the two objects being placed far enough apart in the same vertical plane to permit of a clear view between them with either eye of the far object.

All these discs are attached to an axle to the end of which is fastened the bar, 2.5 meters long, carrying the weights, M and N, which serve as the driving power of the apparatus. These weights are of equal mass, therefore the moment of turning of the system is governed, roughly speaking, by the

two factors: the combined distance of the two weights from the center of rotation, and the difference in the distance of the weights from that point, provided, as already stated, the swing is always begun at the same place in the arc thru which the system turns. To give stability of support, the axle turns in bearings at the ends of the two arms of a heavy Y-shaped support. A clutch, adjustable in height, supports the bar before it is released for its swing and guarantees that it always starts from the same position.

four corresponding  $45^\circ$  positions in any order that may be chosen.

The card itself is mounted at its center on a small metal disc at the end of a grooved pin 6.5 cm. long. This pin passes through a collar provided with a set screw, which feature permits of a certain latitude of adjustment of the distance of the test-card from the exposure discs. To provide for the rotation of the test-card this collar turns in a sleeve supported by a grooved carrier. This carrier slides on a track to permit of the needed latitude of ad-

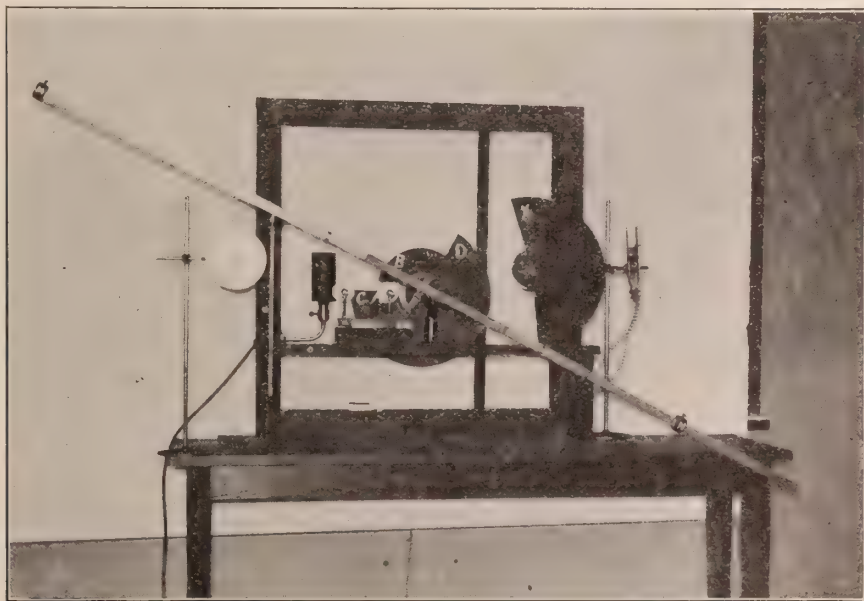


Fig. 2. Simpler apparatus for testing time required for adjustment of eyes for clear seeing at different distances. For explanation see text beginning page 772.

The discs A and C are pinned permanently to the axle in such a position that when the bar is held in the clutch, A just covers one of the test-objects and C the other. The discs B and D are free to turn about the axle, and when adjusted for a given value of exposure, are clamped in position by means of a nut and washer. Immediately in front of these discs are the two octagonal cards, along each edge of which at its exact center are printed one of the test-letters. These E's are so turned that by rotating the card the letters can be presented all precisely at the same place, pointing up, down, right, left, and the

justment of the test-object to right and left.

The far test-object is printed on a larger circular card which is mounted at its center on a small metal disc at the end of a pin which passes thru a broad collar permitting of its free rotation. At the other end of this pin is a pulley so arranged that, by means of two cords which thread thru a guide-ring 21 cm. below the center of the pulley, the card can be rotated to any position desired by the experimenter stationed at the exposure apparatus. The circumference of this card, which turns immediately behind a pointer, is graduated in degrees to

indicate the meridian into which the test-letter is turned. Between the observer and the exposure discs, as near to the discs as possible, is a cardboard screen with an aperture of such a height and breadth as to give a clear view of the near and far test-objects with either eye, and to cut off the rest of the field of view and the moving discs.

The near test-cards were illuminated by diffuse light reflected from the mat surface of the back of the cardboard screen between the observer and

nation at the test-object was 5.2 foot-candles. The general illumination of the room was indirect, with an average value of 2.89 foot-candles, horizontal component; 1.11 foot-candles, vertical component; and 2.64 foot-candles, 45° component.

The experimental procedure was as follows: The three test-objects and the eyes of the observer were adjusted to the same vertical level, and the two near test-objects were separated far enough to give the observer a clear view of the far object with either eye.

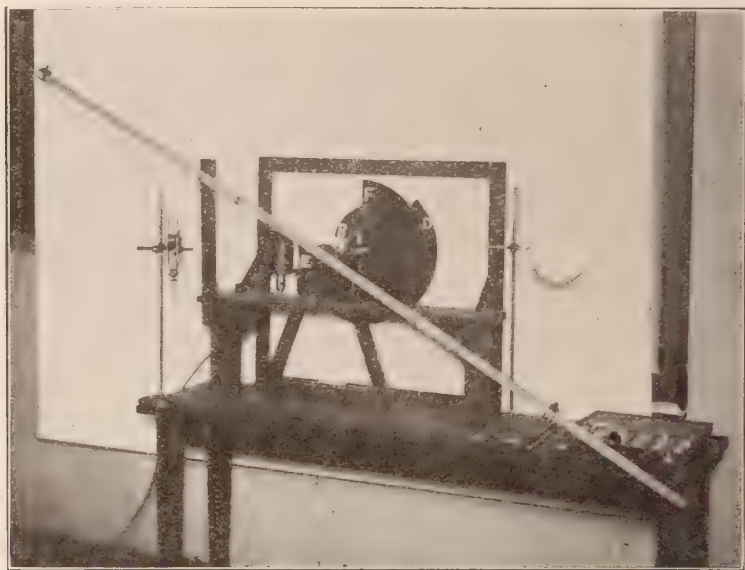


Fig. 3. Second form of apparatus for testing inertia of adjustment of eye for different distances. See explanation of Fig. 2 and also page 775.

the exposure discs. The light was supplied by a tubular tungsten lamp enclosed in a cylindric housing provided with a vertical aperture of suitable breadth. This housing can be rotated about the lamp to give the proper angle of incidence of the light on the reflecting screen.

The far test-object was illuminated by a tungsten lamp mounted in an X-ray deep bowl reflector so directed as to give an even illumination of the test surface and to shield the eye from glare. All the test objects were brought as nearly as possible to a brightness and color match at a brightness value of 0.007 candlepower per square inch. The value of the illumi-

Discs A and B were adjusted so as just to permit of the discrimination of the near object immediately in front of them; and C and D, the discrimination of the far object in case the time to pass from near to far is wanted, and of both the far object and the remaining near object in case the time of the double excursion is desired. In making each determination three correct judgments out of a possible five were required. A preparatory adjustment of the observer's eye was secured by having him fix a point on the discs in line with the near object first exposed and 3 mm. behind it. In order that the preparatory interval be as favor-



able as possible, the observer was required to give the signal for the release of the pendulum.

It should be noted in passing perhaps that the adjustment of the discs A and B is not made entirely or even primarily for determining the lag in perception with the eye in approximate adjustment for the near object, although that is an item that might be of value in our comparative study of the lag of the ocular functions of different individuals. It has been made chiefly in order that the determination of the time to pass from near to far and back again to near shall be made with greater precision. That is, it is obvious that if the observer is to begin his excursion from near to far with an exact adjustment for clear seeing at near, it must be required as a check that he start with a task which involves a report of clear seeing at near.

The mere instruction to fix a point, for example, will not guarantee the needed adjustment. Moreover, it is equally obvious that the adjustment must be precisely controlled; if the results are to be safeguarded against the variable error that has already been discussed with reference to the exposure of the far object. That is, if it is not controlled, the eye may linger too long at near or begin too soon its change toward far; and the amount of deviation in either regard may vary from time to time and from individual to individual.

In the second type of apparatus (Figure 3) our purpose, it will be remembered, was to make it possible to do all that could be accomplished with the first apparatus, and in addition to provide for the separate determination of the time required to pass from near to far, and back again to near, in a single swing of the pendulum. In order to do this it was necessary to have behind the near test-objects a second set of discs attached to the same axle, one of the sectors of which, when properly adjusted, cuts off the far object as soon as it is discriminated. That is, in this apparatus the aperture of the two smaller sectors, A and B, of the nearer set of discs gives the time of

perception of the near object on the observer's left; the aperture between B of this set and F of the farther set gives the time needed to pass from near to far; and the aperture between this disc and the disc D of the nearer set the time required to pass from far back again to near.

The other discs, E of the far set and C of the near set, are pinned permanently to the axle and are rigidly connected with the edge of each at exactly the same level. Both sets of discs are provided with graduated circles. At the edge of each of the moveable sectors are pointers for reading the values of the open sectors. As the apparatus now stands, the two sets of discs are both between the Y-shaped support and are only 10 cm. apart. Since the graduated circles are on the back of each set of discs, this makes the reading of the circle on the near set somewhat inconvenient. In a new apparatus now in construction the near set will be attached between the observer and the support in which the axle turns, and the far set beyond this support. This provision will give ample space between the two sets of discs for the convenient reading of the scale on the near discs.

Also in the newer form of apparatus the near test-cards are illuminated by a tubular tungsten lamp installed in the horizontal in a plane midway between the screen and the near test-objects, so that the center of its filament is about 12 cm. above the two test-objects and equidistant from them. The test-objects thus receive their light in part directly from the lamp and in part by reflection from the screen. In this way it is possible to make the intensity of light received by the two objects more nearly the same than is the case with the illuminating device shown in Figs. 2 and 3. On the platform between the two sets of discs is installed a second lamp, suitably shaded, which can be turned on and off at will for the reading of the graduated circle on the back of the set of discs nearest the observer. (Since the above paper was presented this newer type of apparatus has been taken

overseas for the purpose of studying and checking up the diurnal variations in the ocular condition of the aviators on the western front.)

With both types of apparatus, all readings are made in terms of degrees of open sector. These readings can, after any number of sets of observations, be converted into units of time by a simple process of calibration. Smoked paper is clipped to the disc across the open sector; the pendulum is released with the weights, the starting point, etc., just as they were in the original determinations; and a time line is run across the open sector by means of an electric tuning fork whose vibration frequency is known. The paper can be removed, shellacked, and counted at leisure. In counting, the given degree values can be laid off on the shellacked record by means of another protractor. If the discs are made of material (light cardboard, for example, instead of aluminum) so light that the different positions of the moveable discs do not change by significant

amounts the relative accelerations of the pendulum at the different points in its path, a calibrating chart may be made once for all for the full range or any range of open sector that may be desired.

Another method which we have used is to have contacts soldered to the edges of the sector, in circuit with an electromagnetic time-marker writing on the smoked paper of a kymograph. Because of a certain amount of lag in this system of recording, the method was abandoned in favor of the one described. In practical use, however, where an exact quantitative rating of performance is not required, there is no particular need of converting the readings on the scale into units of time. This is especially true if the apparatus is used, as is the Snellen method of rating acuities, merely to classify performance roughly by the rank method. That is, in this case it is set to give in turn the different levels of performance chosen, and the eye is rated by the highest level which it is able to attain.

## PERMANENT VASCULAR CHANGES FOLLOWING INJURIES TO THE EYE.

EDWARD JACKSON, M. D.

DENVER, COLO.

Report of cases of thrombotic obliteration of the choroidal vessels following trauma and avulsion of optic nerve; giving the ultimate results of such injuries. Read before the American Ophthalmological Society, July 9th, 1918.

The cases here reported have these points in common. In each there was a clear and definite history of severe injury to the region of the eye, followed immediately by permanent blindness. The nutrition of the eyeball remained good, and there was no obstacle to ophthalmoscopic study of the late results of the injury. In each case the vascular conditions found were of particular interest.

Case I.—M.B., a retired rancher, general health always good, aged 78, was struck on the right eye by a chip of wood 39 years ago, and from that

time the eye was blind. There was no protracted or severe inflammation. Cataract formed, which was extracted 10 or 12 years later, without restoring sight. 1915, Dec. 27. The left eye had been losing its sight for two or three years. Vision was reduced to light perception, with good light projection, by senile cataract. In each eye there was an old non-vascular pterygium, extending 3.5 mm. on the nasal side of the cornea, which had probably developed before the injury.

The cataract was removed from the left eye by extraction with iridectomy.





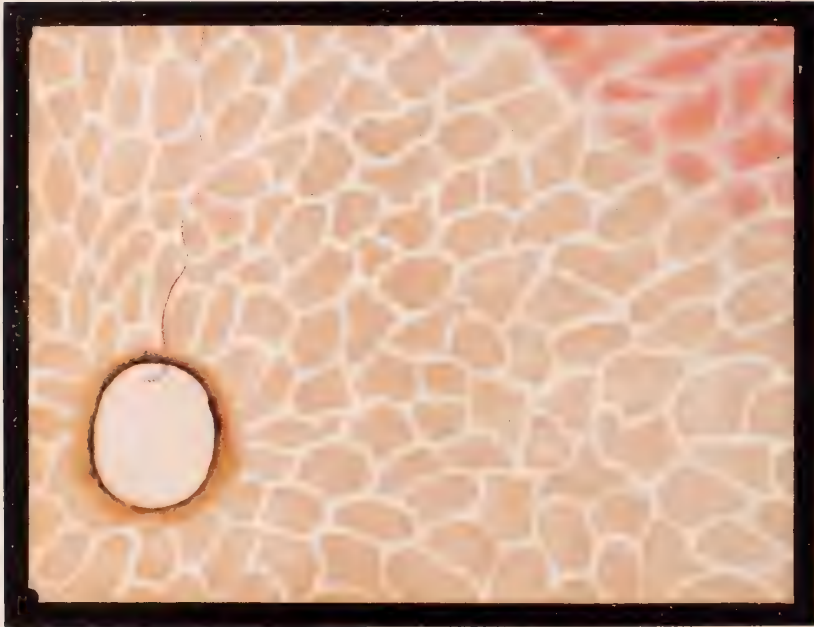


FIG. 1—OBLITERATION OF CHOROIDAL VESSELS



FIG. 2—AVULSION OF OPTIC NERVE AND RUPTURE OF CHOROID

Healing was uneventful. Corrected vision obtained was 0.7, with a + 12. sph.  $\ominus$  - 3. cyl. axis  $80^\circ$ . The ophthalmoscope showed in this eye a normal fundus.

In the right eye there was an upward iridectomy, the crystalline lens was absent, the remaining capsule almost clear. The vitreous presented a few small opacities. The ophthalmoscopic picture is reproduced in Fig. 1. Plate XVII.

But one small retinal vessel was visible, passing upward. The optic disc was grayish white, and quite devoid of small vessels. Its margin showed a normal ring of pigmentation corresponding to that of the left eye. The whole central region of the choroid, extending from four to six disc diameters from the disc showed complete absence of retinal pigment and choriocapillaris, and obliteration of the larger choroidal vessels. The latter were replaced by grayish white bands, sharply outlined by retained choroidal pigment. In the periphery of the fundus the capillary circulation of the choroid was present and seemed normal, and the larger choroidal vessels were normal in appearance, there being very little retinal pigment.

Case II.—B.W.G., attorney aged 36, good general health. When 7 or 8 years old was struck in the left eye with a pointed stick and has been unable to see with it since.

Right eye: Vision: 0.8 with + 0.62  $\ominus$  - 1.12 cyl. ax.  $80^\circ$  = 1.

Left eye: Vision: 0.012. Not improved by glasses.

Externally both eyes appear normal, except that the left diverged 50 to 55 centrad.

*Ophthalmoscope:* Right eye: Media clear, choroid slightly thinned and patchy. Disc slightly red and hazy, with small central physiologic cup.

Left eye: Dust-like opacities were found in the upper temporal part of the vitreous. Other parts of the fundus sharply seen. Retinal pigment layer and chorio-capillaris were completely atrophied except in the upper quadrant of the fundus. Bands of white

tissue behind the retinal vessels are seen running from the optic disc to the extreme periphery, accompanying the upper nasal and temporal vessels; and a third linear band runs horizontally outward. Many of the larger choroidal vessels show the grayish-pinkish-white of choroidal sclerosis. The color shown in Fig. 1. There were many small pigment deposits in the retina, some in front of the retinal vessels, some branching like bone corpuscles, some rounded, most of them irregular in outline. The optic disc was red and slightly hazy. The retinal vessels were rather small especially the arteries; except upward where they were about normal. Above the disc the fundus was 2 D. myopic; in other directions it started with emmetropia at the disc margin, and became gradually more hyperopic, reaching 4 D. at the periphery of the visible fundus. Oblique illumination showed a linear Y-shaped opacity in the posterior nucleus or deep cortex, a fine gray line not visible with the ophthalmoscope. This eye had gradually diverged to 55 centrad. This was corrected by advancement with tenotomy. The healing was in all respects normal, and vision continues unchanged.

Case III.—J.O.E., a boy of 12, near-sighted since 4 years old, was knocked down by a cow three years ago. He was struck in the left eye which had been better than his right before that time. The lower lid was torn away except at the nasal end, the upper lid has drooped ever since. The eye was torn out of its socket, but was replaced by the physician who saw him at the time, and the wound stitched.

The left lower lid represents an inconspicuous scar extending 37 mm. down and out from near the everted lower punctum, and having three branches. The eye is about in normal position but is rotated down until the upper margin of the left cornea is about on a level with the upper margin of the right, when the right eye is in the primary position. The margin of the left orbit feels normal except the lower margin near the nose where it is irregular.

There is complete ptosis of the left eye but the palpebral fissure can be opened to full width with the fingers. It then shows about 5 mm. of cornea with the sclera above it. The extreme opening of the fissure by voluntary effort is about 4 mm. showing the upper 2 mm. of the cornea and 2 mm. of sclera. The eye can be turned up 2 or 3 mm. and laterally almost to the normal extent. Movements of the right eye normal. The left eye seems fixed by scar tissue, below, and back of it.

The pupils in fair light are: Right 3 mm., left 6 mm., in diameter. Movements of the right normal, left a sluggish consensual reaction, no direct reaction to light. Both dilate to 8.5 mm. with homatropin.

Right: Vision = 0.12, with - 6 sph.  
 C - - 1. cyl. axis  $178^\circ$  = 1.1.

Left: No light perception. 2 d. myopic.

The crystalline lens is in normal position in the left eye.

The ophthalmoscope shows the right eye, media clear, disk normal. Choroid rather light and patchy. Left eye: Media clear, the general appearance of the fundus resembles that of the right eye. The optic disc is replaced by an oval bluish-white area, vertically about one and one-half times the normal diameter of the disc in length, and the width of the disc, with brownish black pigment splotches all around its margin, which is a little irregular, as shown in Fig. 2, Plate XVII.

This space is slightly depressed, not over 1 D., and seems to be filled in with connective tissue. It is devoid of vessels. Retinal vessels about normal in size and appearance emerge at the upper and lower ends of this area. To the temporal side of the disc is a crescentic area presenting the usual appearances of so-called rupture of the choroid.

#### COMMENT.

These three cases take added interest when we compare them especially with regard to the points in which they differ. The striking thing in Case I is the almost complete disappearance

of the retinal and choroidal vessels with complete absence of evidences of serious intraocular inflammation. The condition seems best explained by the hypothesis of injury to the vessels back of the eyeball causing complete thrombotic obstruction in the area of distribution for the posterior ciliary arteries; with preservation of the circulation in the region of the anterior ciliary arteries, as shown by the circulation, apparently normal in the anterior portion of the uveal tract. Along with the posterior ciliary, it is evident that the central retinal vessels had suffered and both had been obliterated except the single small branch extending upward from the disc, and its visible complementary vessels. We must conceive that from some source a diminished nutritive supply was kept up, sufficient to prevent tissue necrosis. But the anastomotic provision for this was too late or insufficient to reestablish any of the obstructed vascular trunks.

The picture of choroidal sclerosis, obliteration or atrophy of the larger choroidal vessels, or disappearance of the chorio-capillaris, is well known, and frequently alluded to in the literature, altho curiously any broad, complete account of the condition seems to be lacking. The allusions to it and descriptions of it are, perhaps, most numerous in Adam's *Ophthalmoscopic Diagnosis*. But almost invariably this condition has been confined to quite limited portions of the fundus, and evidently arose in connection with general vascular disease, or some local inflammatory condition. No case of such extensive vascular change, with so little evidence of other disease in the eye, following trauma seems to have been recorded.

Case II in contrast with Case I presented evidence of choroidal sclerosis in small areas, and obliteration of some of the vessels, while others were normal in appearance; the retinal circulation remaining practically normal. With these sclerotic changes were distinct evidences of severe inflammatory reaction. The white streaks behind the retinal vessels were such as would



be likely to follow extensive hemorrhage, and with them were associated pigment massings and atrophies that pointed to inflammatory reaction. These conditions were widely distributed but somewhat less pronounced than those shown in the plate accompanying an article by Hepburn.<sup>1</sup> This association of late effects of hemorrhage and inflammation we have all seen with the ophthalmoscope following trauma.

Case III must be regarded as one of avulsion of the optic nerve, partial or complete. It would be impossible to determine just how nearly complete it has been.

The reported cases of avulsion of the optic nerve fall naturally into two groups. In a larger number of cases the eyeball has been completely gouged out, or has hung by tissue that was promptly divided; or any view of the interior of the eye has been prevented by massive hemorrhage and subsequent opacity of the media. This case belongs with the smaller group, where valuable ophthalmoscopic observations have been possible, sometimes immediately after the injury, but generally after a longer interval. One of the most interesting of recorded cases is Lang's case<sup>2</sup> in a boy of 14, seen within 24 hours after the injury. Vision = 3/60. The upper half of the field of vision was gone, and at the lower part of the optic disc there was a black chasm, where the nerve had been torn loose. At the end of six weeks this chasm had filled in, the dark cavern being represented by a shallow white pit 1.5 D. in depth. Vision and the fields remained unchanged.

In the case reported by Salzmann<sup>3</sup> the ophthalmoscope showed at first a deep hole in place of the optic disc which seemed to fill from the bottom, and contract. Birkhauser's case<sup>4</sup> which was also caused by the horn of a cow, was seen the day after the injury. The horizontally oval optic disc was bounded below by a black crescent where a portion of the nerve had been torn loose. At the end of six weeks this was replaced by a white gray area, showing no parallax as com-

pared with the optic nerve head. The field of vision remained unchanged. In other cases, first examined ophthalmoscopically at a later date, the appearances presented were similar.

Some doubt was raised, as to the reality of avulsion of the optic nerve in Case III, although the eyeball had been completely dislocated from the orbit, by the comparatively normal appearance of the retinal vessels seen above and below the filled in nerve entrance. But this comparatively normal appearance of the retinal vessels has been noted in the cases where the actual partial tear was seen immediately after the injury. It is quite striking in Lang's representation of the appearance at the end of six weeks. In Birkhauser's case the upper vessels might be regarded as normal and the lower vessels appear at the edge of the black chasm of apparently normal size, only each of the main branches becomes embedded in a large club-shaped hemorrhage.

In the case reported by Natanson,<sup>5</sup> which was seen two weeks after the accident occurred, with the cavity left by removal of the optic nerve partly filled in, the retinal vessels, not greatly altered in proportion, appear most of them at the margin of the cavity, as in my case.

In Parsons's<sup>6</sup> case of division of the optic nerve by a stab wound, while there was great edema of the papillomacular region resembling retinal embolism in the retinal vessels, altho pressure showed the blood in the vessels to be under reduced vascular pressure, they were of good size, the veins slightly larger than the arteries, and both were of nearly the same color, which resembled that of normal veins. Parsons suggests: "As soon as organization is sufficient to withstand the low venous pressure, the vessels will commence to refill thru the direct and the indirect cilioretinal anastomoses near the optic disc. These anastomoses are rather venous than arterial; hence the veins will fill up first. This is what we have seen actually occurs, and it takes place on the fourth or fifth day. The blood is, of course, de-

rived from the recurrent branches of the intact anterior ciliary arteries, and also from any posterior ciliary arteries which may have escaped section. The retinal arteries probably fill up first from the periphery, the blood trickling in the wrong direction from the already refilled veins."

Cases in which a histologic examination of the parts was made have been reported by Reis<sup>7</sup> and Liebrecht,<sup>8</sup> but their accounts throw little additional light upon the ophthalmoscopic appearances. The anatomic conditions of recent rupture of the choroid have been observed by Alt.<sup>9</sup>

In every serious injury to the vessels, thrombosis is a first step in the process of repair. In the vessels of the eyeball and orbit it rarely extends sufficiently to increase the damage done by trauma. In the majority of cases it helps to secure reestablishment of the circulation. But it may become a factor in extending the damage done within the eyeball, as has occasionally occurred in the orbit following injections of paraffin into the tissues, or injections in the region of the lacrimal sac. It might be well to consider this even in connection with operative trauma.

#### REFERENCES.

1. Hepburn. Tr. Ophth. Soc. United Kingdom, v. 32, p. 362.
2. Lang. Tr. Ophth. Soc. United Kingdom, v. 21, p. 98.
3. Salzmann, *Zeitschrift für Augenh.*, May, 1903, p. 490.
4. Birkhauser. *Klinische Monats. f. Augenh.* v. 48, 1910, p. 432.
5. Natanson. *Klinische Monats. f. Augenh.* v. 50, 1912, p. 220.
6. Parsons. Roy. London Ophth. Hosp. Reports, v. 15, p. 362.
7. Reis. *Graefe's Archiv f. Ophth.* v. 67, p. 360.
8. Liebrecht. *Klin. Monats. f. Augenh.* v. 47, 1909, p. 273.
9. Alt. *Ophthalmic Review*, v. 16, p. 289.

## UNRECOGNIZED CHRONIC SIMPLE GLAUCOMA.

EDWARD J. BROWN, M. D.

MINNEAPOLIS.

A report of cases showing the association of eye strain and noninflammatory glaucoma.

In a paper with the above title read by me at the Pittsburgh meeting of the American Academy of Ophthalmology and Oto-Laryngology in October, 1917, I presented clinical evidence in favor of the following propositions:

1. Simple glaucoma is the result of eye-strain as shown by the fact that women suffer more frequently than men, and that dressmakers and seamstresses suffer more frequently than other women.

2. The writings of Priestley Smith and Samuel D. Risley show by implication that the dividing line between myopia and simple glaucoma is largely an imaginary one, depending upon the greater or less degree of resistance of the fibrous envelope of the eye.

3. Intraocular tension is relative, and the tension that is sufficient to cause stretching of the fibrous coat of the eye is probably sufficient to cause damaging pressure at the same time upon the optic nervehead and upon the delicate structures of the ciliary region, and with a more resistant sclera the latter effects will be the more in evidence.

4. Numerous cases are constantly passing thru the hands of ophthalmologists as simple refraction cases, which present more or less of the following conditions: Engorgement of the episcleral vessels, unequal tension, subnormal sensibility of the cornea, shallow anterior chamber, paleness and concavity of the temporal disc, con-

traction of the visual fields, especially for colors, and enlargement of the blind spot of Mariotte.

The following cases have especially interested me as further evidence in that direction:

Case 1.—Dr. R., 70 years of age, consulted me in 1914 for an aural trouble. I had known him for many years and had noted in former years that his eyelids were congested. He once in the absence of his oculist asked me to prescribe for some acute condition of the lids. I found he was wearing sphericals for reading and suggested that he ask his oculist to give him a correction for his astigmatism, which was later done. In March, 1915, I noticed a slight dilatation of his pupils and suggested an examination of the eyes. He was wearing from his former oculist: R. and L., each  $+0.75 \text{ C} +0.50 \text{ C}$  axis hor. with a presbyopic correction. My findings were as follows: R.  $+0.62 \text{ cy. ax. } 180^\circ = 20/15$ . L.  $+1.25 +0.87 \text{ cy. ax. } 177^\circ = 20/15$ . The temporal discs were slightly cupped and the relatively enlarged veins in places obliterated by the crossing of the arteries. Tension seemed normal to the fingers. Either because of my remissness, or because the patient was a physician, the fields were not taken. In November, 1915, there was some discomfort in reading and a slight increase in the astigmatism. Corrected vision: R. 20/20 and L. 20/15.

On the 17th of January, 1916, tension seemed slightly plus. The tonometer registered 30 mm. of Hg. in each eye. There was marked contraction of both form and color fields, the former mostly inside fifty degrees. Under 1 per cent pilocarpin muriat t. i. d. one week later the tonometer registered 19 and 25 mm.

He returned in November, ten months later (for his ears). His astigmatism was slightly greater in the right and less in the left eye. He had long since discontinued the pilocarpin. Tonometer 20 mm. Vision good; but the fields markedly contracted, for white mostly inside thirty degrees. The pupils were slightly dilated. He

was urged to be faithful with the pilocarpin. In June, 1918, vision is normal, the form fields have returned nearly to the normal, tension was normal and both discs slightly concave, the right entirely and the left only the temporal half.

Case 2.—W. E. N., 62, (case of Dr. Charles Nelson Spratt) consulted Dr. S. on the 12th of December, 1917, complaining of steamy vision of R. No history of pain. V., R.  $5/12$  plus,  $+1.25 = 5/6$  plus. V., L.  $5/12$ ,  $+1.75 \text{ C} +.50 \text{ cy. axis, } 120^\circ \text{ V.} = 5/4$ . R. cornea hazy, pupil dilated, disc not cupped, tonometer 43 mm. Hg. L. cornea clear, tonometer 17 mm. Hg. December 19, after use of miotic, R. cornea clear, tonometer 36 mm. December 26, tonometer 25 mm. January 16, V., R.  $+1.25 = 5/5$ , tonometer, both normal. March 11, V., R.  $+1.25 = 5/7$ . Tonometer 21 mm. April 8, V., R.  $+1.25 = 5/200$ . Tonometer 51 mm. April 9, Lagrange operation. April 22, eye white. April 29, V., R.  $+6$ . Cyl. axis  $15^\circ = 5/30$ . I had had the pleasure of seeing the entirely smooth operation, and on May 14, Dr. Spratt had the kindness to bring the man to my office. The operative result seemed ideal, a fine large bleb over the iridectomy, but vision was  $=5/200$ , the swollen lens afforded no view of the fundus details, and the tension was 48 mm. Hg. I found a moderate temporal cupping of the left disc, and the same had probably been the case with the right.

Case 3.—M. A. S., 44, bookkeeper, came to me in 1910 with the complaint of misty vision especially of horizontal lines. V., R. and L., 20/20+. She had not worn glasses. Her quarter diopter of astigmatism was corrected, and 1 D. presbyopic correction added. There were also L. H.  $1/2^\circ$ , Exoph.  $2^\circ$  and abduction  $9^\circ$ . In 1914 2 D. presbyopic correction was given.

In January, 1918, she complained that vision had been bad for two months. She accepted an addition of a half diopter sphere to the distance correction, which gave V., R. 20/30, L. 20/30. A presbyopic correction of 2.50 D. The anterior chambers were



shallow, the irides dull, the pupils sluggish, temporal discs 2-3 D. concave, tension apparently normal, the fields for white contracted from ten to twenty degrees, for red mostly inside fifteen degrees. Each blind spot of Mariotte at 2 meters is 35 cm.

She was given a 1-24,000 solution of eserine sulphate for use four times daily. She has a moderate sized goiter and for the nervous symptoms was given 2 grains t. i. d. of hydrobromide of quinine.

On July 31, Miss S. complained of having more or less pain in her eyes.

20/15. I had not seen her again till Aug. 1 of this year, when she came with the complaint that she had foolishly looked for some moments at the solar eclipse of June 8 without a protecting glass, since which her vision had been bad. The dark spots of which she had complained had gradually disappeared but the eyes remained weak. No scotoma was demonstrated in either eye, vision with her glasses was 20/30, and could be only slightly improved by the addition of +0.12 cyl. The corneas were 12 mm. in diameter, subnormally sensitive, the anterior

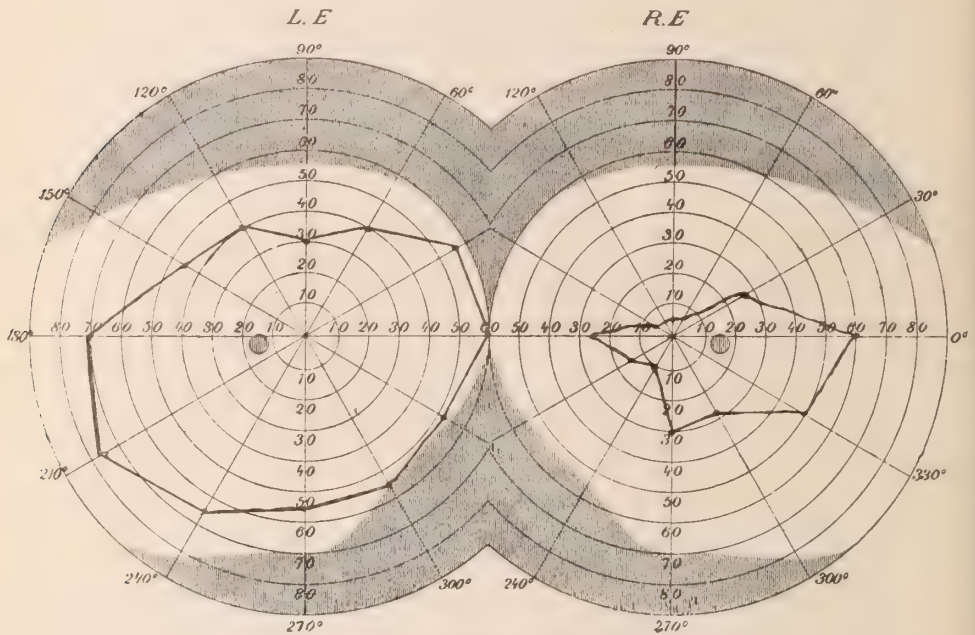


Fig. 1. Fields of vision in Case II, taken April 8th, 1918.

She accepted the following: R. +1.75 +0.25 c. 45°; L. +1.50 +0.25 cy. ax. 90° = 20/15. Evidently a cycloplegic should have been used years ago. I neglected to say that her exophoria at 13" is now 16°, an element of eye-strain of no small importance.

Case 4.—Miss E. B., 31, stenographer, wearing +0.75 cy. axis 90° from an optometrist, consulted me in 1910 for pain in her eyes. Under scopolamine the addition to her correction of plus 1.50 spheres gave vision of

chambers shallow, tension apparently normal, the temporal discs about 2 D. concave, the blind spots of Mariotte at 2 m. 27 cm.; and both form and color fields defective, especially the latter. Miss B. was given eserine sulphate solution 1-24,000, one drop to be used in each eye at bed time. The following morning she reported the eyes feeling better than for a long time, and the corrected vision of each eye was 20/15. The addition of +0.75 D. gave Jaeger 1 at from 10° to 18°.

Case 5.—A. B., 61, attorney, alcoholic and impecunious, came to me in 1905 with the complaint that for two years he had been inclined to miscalculate distances on going up or down stairs; and for a year and a half had noticed growing failure of the vision of the left eye. No pain or other symptoms. The eyes were large and prominent, the cornea 12 mm., anterior chambers rather deep, tension not noted, probably appeared normal. The right optic disc was slightly cupped in the temporal half, the left rather deeply in its whole extent, with undermined edges. V., R. 20/20, +0.50 cy. axis  $90^\circ = 20/15$ . The left eye could not count fingers. The right field for white was normal, the left field was limited to the temporal, outside fifteen degrees from the center.

Eight years later, in 1913, he returned for a change of lenses having had no treatment in the interval. Tension seemed slightly plus in both eyes. The left field was limited to a small paracentral area  $30 \times 20$  degrees, the right form field still normal, color fields not taken. V., R. +0.75 C

+0.25 cy. axis  $60^\circ = 20/15$ . One year later a quarter diopter addition to the cylinder and a slight change of axis. Vision = 20/20.

In 1916 B. concluded to settle down to business and have the remaining eye cared for. In May the right field contracted from 20 to 30 degrees, the horizontal diameter of the blind spot 31 cm. at 2 meters. Tension clearly plus but no complaint of pain, tonometer 30 and 80 mm. of Hg. After a few days' use of a weak solution of eserine the tonometer registered 22 and 35 cm. Hg. In April, 1917, under the use of 1-12,000 solution of eserine, the pupils were slightly dilated and vision —20/30, tension plus and the field mostly inside of  $40^\circ$ , the defect on the 60th meridian reaching within five degrees of the center. The blind spot was  $35 \times 50$  cm. at 2 meters. Under a 1-6,000 solution the eyes became softer, and in June the paracentral defect had disappeared and the field was concentrically about  $35^\circ$ . In August, 1918, corrected vision is = 20/20, fields and objective conditions much the same as one year ago.

## NOTES, CASES, INSTRUMENTS

### PARALYTIC STRABISMUS CURED BY SIMPLE OPER- ATIVE PROCEDURE.

DR. JESSE S. WYLER.

CINCINNATI, OHIO.

On February 10th, 1917, a baby of eleven months was brought to my office by the mother who was greatly perturbed by the prognosis of an eminent ophthalmologist regarding the sight of her child. This physician had informed her that the brain of the child had been damaged by a prenatal hemorrhage, that part of the face was palsied, and a great part of the sight of the remaining good eye had been destroyed.

The patient was a fat healthy baby, of grotesque appearance due to a con-

vergent strabismus of the left eye of nearly  $45^\circ$ . This ocular deviation had existed since birth. The child made no effort to turn the left eye toward the temple and when the right eye was turned nasally the left never moved past the median line. Dilation of the pupils with atropin 1 per cent, showed that the ocular media were clear. The disc of the right eye was apparently normal surrounded by an area of choroidal atrophy. Above the disc was a coloboma of the choroid about the size of ten papillae. The left fundus seemed normal, with possibly a patch of pigment below the disc. As the ophthalmoscopic picture in eleven month babies is not very steady, a more careful study could not be made. The vision seemed good for each eye tested separately with small marbles.

A diagnosis of strabismus due to palsy of the left externus with contracture of the left internus was made. I first attempted to apply the simple measures of conservative treatment, instilling atropin in the good eye and also using a cover pad. These, as may be expected, proved worthless as the child was unable to rotate the left eye.

In October the mother began to insist that something radical be done. Never having performed a muscle op-



Fig. 1. Result of operation for paralytic squint. (Wyler.)

eration on a baby so young, and altho feeling rather dubious about the results, I decided to tenotomize the internus of the squinting eye, expecting to either advance the paralyzed muscle at some future date or to perform a tendon slip transplantation. The mother was told not to expect a great change.

On October 21, 1917, under a general anesthetic a complete tenotomy of the internus was made. A double armed silk suture was then passed close to

the temporal side of the limbus, taking a good grasp in the conjunctiva and upper scleral layers and brought thru the skin of the temple. Upon tying this supporting suture, the eye rotated to the outer angle. This supporting suture was allowed to remain "in situ" for three days. Upon its removal, the eye turned back to the median line, and since that time we have succeeded in exercising the lateral motion to the left by constantly attracting the patient's attention to that side. The eyes now are in perfect position with a fair action on the part of the externus, altho the patient still has a slight compensating twist of the head when looking toward the left. No secondary operation will be necessary and the latest photographs are those of a child with perfect orthophoria.

The marvelous end result in this unfavorable condition is my excuse for this report.

## THE RELATION OF LUES TO OCULAR PATHOLOGY.

CAPT. JAMES M. BLACKWOOD, M. D.

Publication authorized from office of  
Surgeon General U. S. A.

Much has been written on the relation of lues to ocular manifestations. Massive evidence must yet be accumulated both to substantiate and disprove theories now in vogue. In presenting the following observations, the writer does not pretend to claim either the foreword or the last verse of the tragedy. Were these findings to be considered a small link in the mighty chain which will be woven as the experiences of others will be contributed, our work will not have been in vain. The vast wealth of clinical material at Camp Sevier stimulated the gathering of these facts. Eight hundred and thirty cases were observed, when presenting themselves at the eye dispensary, among which 36 were proven to be syphilitic. Of the 36 cases, 14 suffered with demonstrable ocular pathology. Of the different ocular mani-



festations, the following classifications were made:

1. Optic Neuritis—4 cases. Three of these denied infection, both by name and symptom, but with positive laboratory reactions. One of these gave positive history dating back two years.

2. Choroiditis—3 cases. Two gave positive histories dating back two years. One gave positive history dating back ten years.

3. Neuroretinitis—2 cases. One denied syphilis by name and symptom, but with positive laboratory findings. One gave positive history dating back two years.

4. Argyll Robertson pupillary reaction—2 cases. Both denied infection by name and symptom. Both had positive laboratory findings.

5. Iritis—2 cases. Both denied infection by name and symptom. Both had positive laboratory findings.

6. Disciform Keratitis—1 case, who gave a positive history dating back six years.

The ages of those having definite pathology ranged from 20 to 38 years. The two cases having tabetic symptoms were 26 and 28 years respectively.

Of the 36 cases listed, 8 who manifested no pathology at first visit, failed to return for further observation.

#### SUMMARY.

1. Four and three-tenths per cent of series of cases presenting themselves at the eye dispensary for ocular symptoms were syphilitic.

2. Thirty-eight and eight-tenths per cent of those having positive luetic findings manifested ocular pathology.

3. Deducting the 8 cases not fully investigated, 50 per cent of all luetics had positive ocular pathology.

4. Fifty-seven and one-tenth per cent of those manifesting ocular pathology denied lues by name and symptom, even when confronted by positive laboratory evidence.

5. Twenty-eight and five-tenths per cent of the pathologic group mani-

fested optic neuritis as the first luetic symptom.

6. Tabes first manifested in ocular symptoms and in early life.

#### INFANTILE DACRYOCYSTITIS.

FREDERICK T. CLARK, M. D., F. A. C. S.

WESTFIELD, MASSACHUSETTS.

Cases of occlusion of the lacrimal ducts, or of occlusion with infection of the sacs in the new born are so unusual that I am reporting this case which has recently come under my observation.

On July 21, 1918, Dr. George H. Janes asked me to see an eight days old child who had developed a purulent conjunctivitis. The child was born in the obstetric department of the Noble Hospital. The mother was a primipara and the delivery was made with the aid of instruments with no injury to mother or child.

From birth the nurse noted a puffiness or swelling in the region of the left tear sac but it was not until the fourth day that pus was noted in the child's eyes. The eyes were flushed with boric acid solution frequently but the pus increased in amount and I was called on the eighth day.

The lids of both eyes were much swollen and on being separated golden yellow pus poured from between them. The left tear sac was tense and swollen and distinct fluctuation was made out. There was some swelling in the region of the right sac but no fluctuation. My diagnosis was ophthalmia neonatorum with infection of the lacrimal sacs.

This diagnosis was apparently confirmed by the bacteriologist's report, Dr. Fred D. Jones, who reported the presence in the smear of gram negative diplococci both intra- and extracellular, also gram positive cocci showing a mixed infection. The diplococci he took to be gonococci but did not differentiate them from catarrhalis cocci by cultural methods. The subsequent history of the case leads me to believe the infection was not gonorrheal.

The swelling and tenderness of the lacrimal sacs increased and on the next day—the baby being nine days old, the left sac was freely incised and a large amount of very yellow pus evacuated. The incised sac was flushed frequently thru the incision with boric acid solution with the result that in twenty-four hours the swelling of the left eye was markedly reduced and but a scanty amount of pus was present in the eye.

The right sac was following a similar course and two days after incising the left sac the right was given similar treatment, and the mother allowed to go home with her baby. At home the sacs were irrigated through the incisions with boric acid solution from a dropper every six hours. In two days all pus disappeared from the eyes and all swelling had gone. The incisions into the sacs were allowed to close but in forty-eight hours had to be reopened and irrigated again. The sacs were kept open and irrigated every six hours till the baby was nineteen days old. Then each capaliculus was incised the smallest possible amount to allow of the passage of a No. 2 Bowman's probe followed by syringing through the canaliculus. In probing it was noted that the lacrymo-nasal ducts were extraordinarily large.

Assured the ducts were patent the sacs were kept open and irrigated for two more days. Then the right sac, because it was cleanest was allowed to close. It received no further treatment.

The left sac was still secreting some pus. The duct was again probed and syringed and two days later the sac had so cleaned up that it was allowed to close. The contents of the sac were expressed into the nose by finger pressure for a few days and no further treatment was required. My last note on the case made when the child was thirty-three days old and when it passed from under observation reads: "August 15, 1918. No fullness over sacs and both lacrimal systems apparently functioning normally. Discharged."

I do not look upon this as a case of ophthalmia neonatorum with infection of the lacrimal sacs. In the light of later developments in the condition of the eyes I believe this to have been a condition of congenital obstruction of the lacrimal ducts. It is probable that the lacrimo-nasal ducts were not fully developed. If developed they were glued together or occluded by a plug of material which normally exists during fetal life and which had not become absorbed. The undrained sacs acted as ideal culture media for pus-producing cocci that are normally present in the birth canal of every woman. Furthermore the quick clearing up of the infection argues against its gonorrheal character.

In the article in the American Encyclopedia of Ophthalmology on Infantile Dacryocystitis the view above expressed is supported by such authorities as Jackson, Gunn and others.

# SOCIETY PROCEEDINGS

## AMERICAN OPHTHALMOLOGICAL SOCIETY.—FIFTY-FOURTH ANNUAL MEETING.

NEW LONDON, CONN.,

July 9 and 10, 1918.

President, DR. WILLIAM H. WILDER,  
CHICAGO.

*(Continued from page 732)*

### Permanent Vascular Changes Following Injuries.

DR. EDWARD JACKSON, Denver, Colorado, read this paper, published in full, page 776.

### Avulsion of the Optic Nerve.

DR. EUGENE M. BLAKE, New Haven, Conn., reported a case of such injury. A man aged 29 was thrown from a wagon, striking his head in such a way that the superior maxilla was fractured and loosened; and the nasal bones separated from their attachments. The left eye, being ruptured and protruding, was enucleated at once. There was also immediate blindness of the right eye, with pupil dilated and immobile. In place of the optic nerve head, the ophthalmoscope showed a deep cavity. The retinal circulation was lacking except in the lower part. The right globe had evidently been forced so far forward that the optic nerve was stretched to the limit, and torn from the eyeball.

### Optic Neuritis and Irido-cyclitis from Disease of Tonsils.

DR. HOWARD F. HANSELL, Philadelphia, Pa., read a paper reporting two cases in which these ocular lesions were dependent upon disease of the tonsils. One patient suffered from acute double optic neuritis and complete transient blindness. Suppurating tonsils were removed, and within twenty-four hours light perception returned. It slowly improved until at the end of one year vision equalled 4/5. But both optic disks showed partial atrophy.

In the second case, chronic irido-

cyclitis had continued for three months, with acute exacerbations. After tonsillotomy, recovery commenced within a few hours; and was rapid and complete.

### Septic Retrobulbar Neuritis, Blindness

DR. WALTER E. LAMBERT, of New York City, reported the case of a woman, aged 64, who had suffered many years with severe headache; but had been relieved by correction of a low hyperphoria. He assumed that the etiology of her more recent trouble was infection from disease of the adjacent sinuses; and in this opinion the ophthalmologist who saw the case with him concurred. There was, however, a different opinion held by the attending physician and the rhinologist. The intensity of the inflammation, the sudden onset and the lateness of the ocular complications, after the patient had been suffering a long time with general toxemia, seem interesting.

On March 27, 1917, she reported having intense headaches. She had been treated for neuritis and a general variety of ailments. The eye condition seemed unchanged. An X-ray examination of the sinuses disclosed the right antrum seriously involved, and a portion of the root of a tooth in the cavity. After operation for this, April 6th, the headaches subsided somewhat, but a slight septic temperature continued. May 7th, blurring of vision of the left eye occurred. Examination the next day showed no light perception. There was a marked papillitis, arteries small; and sluggish, segmental circulation in the veins. Right eye unaffected. Dr. J. E. Weeks agreed that there was a partial occlusion of the central artery of the retina.

On May 10th, the vision of the right eye became affected, with evidence of obstruction of the central artery of the retina. Dr. Weeks again saw the patient, and agreed that an immediate operation upon the ethmoid cells should be done. The operation was deferred. The next day an X-ray



showed no evidence of sinus involvement. On the same day the patient was seen by Dr. Arnold Knapp. Vision had slightly improved, but there was a distinct central scotoma for form and color, tenderness on pressure, and some pain on movements of the eyeball, unmistakably showing an acute retrobulbar neuritis. Vision of the right failed rapidly, and on May 15th the patient was absolutely blind. Total atrophy of the optic nerve followed.

DISCUSSION:—Dr. Edward A. Shumway, Philadelphia, Pa.: Focal infection, as the cause of organic disease of the eye, is becoming an increasingly important factor in our work. I desire to place briefly on record two interesting cases:

The first patient was a woman, twenty-eight years of age. The left eye had become painful ten days, and there was severe pain in the left side of the head. Vision became blurred, and in a few days the eye was totally blind. While not in perfect health, there had been no distinct illness, barring an attack of diarrhea with pain, the week preceding the eye attack.

The left eye had no light perception, and was painful on movement; and the ocular rotations were somewhat limited. There was no pupillary response to light. The ophthalmoscopic examination showed slightly blurred margins and full veins, but no distinct neuritis. The right eye had 6/5 vision; and normal movement, visual fields and eye grounds. No metabolic disturbance was found, the urine and blood were normal, the Wassermann test negative. The nasal sinuses were free from trouble. A suspicious tooth had its filling withdrawn, but no pus was discovered.

The patient was vigorously sweated and purged and given bichlorid of mercury at first. Later, inunctions of mercury were employed, iodides and strychnia, and the galvanic current. Nearly four weeks after the first visit she claimed she could see hand movements. But not until thirty-six days from the time of complete blindness, was there true light perception, and return of the pupil reflex. Slowly vision improved, from hand movement

perception to 6/6. The nerve became moderately atrophic.

The field of vision was very interesting. A small central area of vision first returned, as shown by the fields taken at the time. This gradually widened, especially on the temporal side, and later a patch appeared on the nasal side, but was eventually blotted out.

On the recovery of vision a left hyperphoria of 8°, and an esophoria of 18° was found; showing that there had been an involvement of nerves controlling the ocular muscles, together with the fifth nerve, at the apex of the orbit. Two and a half years later vision was still 6/6. Later an attack of uveitis occurred in the other eye, at which time a wisdom tooth, which had been causing trouble was extracted, with immediate improvement.

The second case is that of a man 78 years of age, whom I saw first May 23, 1918. Nine days before, while in good health, he was seized with severe pain in the top of the head, which later became localized in the left eye. Three days later, diplopia appeared; three days after that, sight failed, and for two days the eye had been blind. There was no light perception, or pupil reaction. The eyeball did not move outward beyond the median line, and its movements upward, inward and downward were greatly restricted; the lid was partially ptosed. The eye ground was quite normal, the nerve head was not blurred, nor were the vessels altered. The right eye had normal vision, and was normal.

A diagnosis was made of periostitis of the apex of the orbit with involvement of the optic nerve, and the third, fourth, fifth and sixth nerves. Other examinations revealed nothing abnormal; but X-ray examination of the teeth revealed abscesses at the roots of each of five remaining stumps, and these were promptly extracted. After treatment with mercury and iodid, and sweating in an electric cabinet, movement of the eyeball began to improve, and all pain disappeared. But up to June 26th, there had been no return of vision.

Both cases represent types of acute retroocular inflammation of the optic nerve, due to an inflammation at the apex of the orbit. Such cases have been ascribed to catching cold, but all such cases should be studied, for the presence of focal infections, and these carefully eradicated.

In all cases of acute retrobulbar neuritis, the possibility of a late appearance of multiple sclerosis should be considered. I have already placed on record such a case, which commenced as a unilateral neuritis, due apparently to ethmoidal sinus empyema; and with Dr. William G. Spiller, I am studying a very similar case at present in which the teeth were at fault. I feel that multiple sclerosis, in which we have multiple inflammatory foci scattered through the central nervous system, may originate in a focal infection in the teeth or sinuses, a view which has been corroborated by Stark of Texas, and by Billings and Rosenau, of Chicago.

DR. WILLIAM A. SHOEMAKER, St. Louis, Mo.: We must not forget the possibility of the direct spread of the inflammation through the nerve by means of perineuritis. This would cause an interstitial neuritis and affect the vision; for in these cases we should expect to find a peripheral concentric contraction of the field of vision, which, indeed, has been found in the cases of sinus involvement. Compression of the retinal vein at its exit from the nerve trunk has been suggested as an explanation of this condition.

I desire to report a case of large central scotoma caused by hyperplastic sphenoiditis, in a man thirty years of age, in which I believe the affection of the optic nerve was by the action of the toxin on the nerve fibers. He had, three weeks previously, observed that his vision was so dim that he could only get around with difficulty. The ophthalmoscope showed clear media, but low-grade inflammation of the optic nerves in both eyes. The chart of the fields showed some concentric contraction of the fields. Color perception in the right eye was limited to 5° from the point of fixation.

In the left eye, the color perception

was indefinite, so that he was never certain about any color. There was a marked central scotoma. He stated that he had never used tobacco or alcohol to any extent. A rhinologist reported that he had a marked hyperplastic sphenoiditis. The Wassermann was negative. The rhinologist operated on the left side, and no improvement of vision followed the operation. Vision began to get worse in the right eye, with central scotoma. Four weeks from the first operation, the right sphenoid was operated on.

A month or so after the second operation, the central scotomas were considerably diminished. Five months after the first visit, vision was only about five or six two-hundredths, and he still had the central scotoma. I believe the poison generated in the hyperplastic sphenoiditis was responsible for these large central scotomas.

DR. JOHN E. WEEKS, New York City: In the case Dr. Lambert reported; at first the optic nerve on the left side was slightly pale; the outlines, a little indistinct, the arteries, small; and the veins, showing a segmented circulation. With this was a history of pus having been found in the antrum. When I saw the case a second time, the arteries on the left side had not increased in size, the veins were still small. The sudden loss of vision with this appearance of the background was, to me, a picture of interruption of the circulation in the central artery of the retina.

The question was whether it was simply from pressure, from spasm, or from a thrombus; but, to me, the most plausible explanation was a thrombotic condition due to the absorption of toxins. I recommended free opening of the sinuses, as it seemed evident that it was a septic process. In the second eye, the appearances were almost similar to those of the first. I was very insistent in my advice to make drainage from the accessory sinuses free, but was overruled. Dr. Lambert concurred in my suggestions. The outcome was complete blindness.

I have at present under observation a case in which the vision was reduced to 6/60, apparently from a sphenoidal sinusitis. The vision three weeks later



is 20/20 minus, from effecting free drainage of the sinus on the right side.

DR. G. ORAM RING, Philadelphia, Pa.: Eight weeks ago I saw a student in the University of Pennsylvania, twenty years of age, splendidly developed, supplementing his regular studies with a military course. Up to two weeks before, he had been regarded as a crack shot in his class. Then he began to fall down in his shooting, and concluded that it was due to blurring of the right eye. His left was normal, but his right had dropped to 20/40. There was a definite posterior hyalitis. It was found that there were two possible sources of trouble: One, in the intestinal tract; and the other, in the tonsils. His tonsils, he had never complained of. But there were half a dozen crypts that evidently had cheesy exudative material in them. The intestinal condition was promptly treated. Iodin and thyroid were given internally, and each crypt was carefully and repeatedly cleansed with iodine and alcohol. The improvement from 20/40 was noticeable promptly, to 20/20 at the end of four or five weeks.

The fundus had not cleared, but was definitely improving. For two or three weeks, there was no improvement that I could observe. It then occurred to me that a more accurate investigation of the condition of the tonsil should be made. It showed an amount of cheesy material in the interior. Having eliminated an intestinal condition, I believe that there is nothing left to be done but a prompt removal of both tonsils, which will be done.

DR. T. Y. SUTPHEN, Newark, N. J.: About six months ago I saw a case of optic neuritis of one eye; and, with the X-ray photograph, ethmoidal trouble was found on that side. The ethmoid was operated on, and the patient made a rapid recovery; altho the vision had been almost nil before the operation.

DR. HIRAM WOODS, Baltimore, Md.: Among cases I reported to this society three years ago was that of a lawyer in Baltimore, who had developed a double uveitis, involving almost the entire tract, with typical symptoms. All the clinical investigations were negative, except that at the root of a tooth, there was found

a suspicious appearance, and the tooth was extracted. As soon as fresh tissue was opened up by the extraction, the man went blind. He had to be led to the hospital. His vitreous became so dense that the fundus could not be seen. After the ordinary treatment with sweats, etc., for three or four days, it began to clear up. When the case was reported vision was 20/40.

He subsequently had a relapse, and the right antrum was opened. The left was found normal. He continued to get not much better. A rhinologist found the left antrum involved, and that was drained. He came back somewhat improved, but not very much. Since then, he has developed the old intestinal condition, and the tooth condition. He has had both antra drained, had teeth extracted, had an ethmoidal operation done, and finally has undergone a mastoid operation. He stood them all, and now has V = 20/20 in each eye. This ran over a series of years, with one infection after another.

It brings up an interesting question: Have we got down to the bottom of these things? In the presence of a number of sources of infection, how can we tell which is important? A young woman, who had a low grade of iritis with deposits on the back of the cornea; had every tooth in her upper jaw pulled out, and was no better. It is up to us to get down to a little better diagnosis, than the mere finding of an eye condition associated with some possible source of infection. The man illustrated a great many sources of infection; and this woman, a perfectly useless sacrifice of teeth, because the X-ray pictures showed, or they thought it did, certain shadows. It may be justified. I am not saying anything against the theory of infection from these foci, but I am pleading for more accurate diagnosis.

DR. J. T. CARPENTER, Philadelphia, Pa.: In these days of intensive laboratory research, it is rather satisfactory to be able to point to the clinical solution of a problem. Five or six years ago, I reported a case before the College of Physicians, exactly similar to those reported by Dr. Hansell. A young woman of twenty years was referred to me on



account of blindness, and there was a moderate neuroretinitis, with a few scattered hemorrhages and swelling of the disc. Vision was reduced to fingers, and the usual search was made for the cause. It was only when Dr. Francis Packard removed the tonsil on the side on which vision was affected that a prompt and immediate return to normal vision occurred. She has since enjoyed absolutely normal vision, and there was prompt subsidence of her ophthalmoscopic signs of neuroretinitis. We can say, in this case, that the focal infection was responsible for the eye condition; because it immediately subsided, and for several weeks every other form of treatment had been used without result.

DR. WILLIAM TARUN, Baltimore, Md.: Because the dentist extracts the tooth and finds it free, there is no proof that the abscess is not present. If the X-ray were taken afterwards, very likely the abscess would still be seen on the film. You should insist that the dentist curette the alveolar processes. Otherwise, the sac remains there after the extraction is done. That is a point frequently overlooked. The toxin comes from a localized abscess somewhere, either in the teeth or the tonsils or elsewhere.

DR. W. G. M. BYERS, Montreal, Canada: The one thing that stands out clearly in the work with these focal infections during the past few years is that one has in the system, almost invariably, multiple foci of infection, which must be dealt with; and that it will not do to draw from the history a few preconceived etiologic possibilities, and rest satisfied, certain of their having been affirmatively proved.

To get the best results and to avoid the evil of which Dr. Woods has spoken, we must adopt a strenuous type of examination. Certain things must be gone through with as a routine. The question that we should have in our minds is: What is the minimum that will give us the full information regarding all the etiologic possibilities underlying any given case? Having these, we can come to some definite conclusion as to what is the right thing to do.

DR. WILLIAM H. WILDER, Chicago, Ill.: I am glad that Dr. Byers has said

what he did. The whole subject is more or less obscure, but there is one element that we must not lose sight of—an element of great importance; and that is the time element in these cases. We are dealing with a possible inflammation of a nerve structure, and time is an important thing. The earlier we make the diagnosis, and the earlier we find the focus of infection, if there is a toxic element, the better for the patient.

We have all seen cases where blindness came on promptly, a considerable time before any sign that can be observed with the ophthalmoscope. This is seen in syphilitic leptomenigitis, in ethmoid, or sphenoid infection, and in infection from other foci. As a routine measure, we should go thru these various investigations as thoroughly and quickly as possible.

In my cases where there is a suspicious origin, I have the prostate stripped, to make sure that there is no latent gonorrheal infection. Whether the lesion in the nerve is a perineuritis, an interstitial infection, or a diffuse infection; whether it is as far back as the chiasm, or affects that portion of the nerve that lies in the orbit, it is not always possible to say; until we have an opportunity to make a pathologic examination. Nor can we tell what the virulence of the infection is. These varying infections have varying degrees of virulence. In some we may expect to find rapid disorganization of this rather small bit of nerve tissue that is so important to the eye. I think ophthalmologists in general, should be urged to make this investigation promptly, and institute whatever method of therapeutics is indicated as promptly as possible.

Dr. Lambert: I should like to add a case almost identical with the second case reported by Dr. Hansell. It was that of a lady with low grade uveitis. The Wassermann was negative. There was a history of rheumatism; but she was in pretty good health except that she had diseased tonsils, which were discovered rather early. These were removed and she made a perfect recovery.

**Hereditary Optic Nerve Atrophy.**

DR. WILLIAM ZENTMAYER, Philadel-

phia, Pa., reported of two families showing the tendency to this condition, with interesting X-ray findings. In the first family there were three males and one female. One male died in youth of typhoid fever; the other two are affected. The female is unaffected. In both of the patients the X-ray showed the pituitary fossa somewhat enlarged. In the second family there were four males and three females. One male died in infancy; the next two are affected, and the youngest is as yet unaffected. Two sisters are unaffected. The mother was the only child. She is unaffected. The father is unaffected.

In one affected male the pituitary fossa was above the normal in size; in the second it was on the border line. In the one unaffected female (age thirty years) the fossa was of the same size as that of the affected male, having the fossa of border-line size. Dr. Henry K. Pancoast, who made the X-ray studies, thus summarizes the findings: Each of the four patients showed a pituitary fossa which was either at the border-line of normal in size, or was slightly past this point.

### **Tuberculin in Affections of the Eye.**

DR. JOHN E. WEEKS, New York City, read the paper published in full on page 753.

DISCUSSION:—Dr. Samuel D. Risley, Philadelphia, Pa.: I should like to report one instance which seems to answer one of the inquiries in Dr. Weeks' paper. During my vacation, my assistant surgeon and my son admitted to the Wills' hospital a large, muscular, but not fat, Russian, apparently in excellent health; who claimed to have always been well. He had a large proptosis of the right eyeball. It was projected forward, by an inflammatory condition, apparently in the orbit, which was diagnosed as a gumma of the orbit. There seems to have been no Wassermann reaction taken, but he was placed on mercurial inunctions, carried to the point of pyalism, but without relief.

All treatment was stopped, and his temperature taken four times daily for a week or ten days, with a uniform even-

ing rise of temperature. In the meantime, he had an immense swelling and tenderness of his parotid gland on the same side, and, in a few days, a swelling of the ramus of the right jaw, intensely hard. He had no bad teeth, and no means of accounting for it by focal conditions present.

Observing the steady and daily rise of temperature, I concluded that I could give him a diagnostic dose of old tuberculin. In a few hours, his temperature began to rise, and went up to a 103°. He suffered in all tissues, and had backache, restlessness and soreness following this dose; and a great increase of his suffering from the orbit and the inflammatory conditions. His temperature went down in forty-eight hours, and then he was relieved from pain in the orbit. The parotid swelling began to soften. I waited a week, and then repeated the dose, with almost similar results. When the reaction subsided, he was enthusiastic over the relief he had received.

The proptosis began to reduce, the hard growth in the ramus of the jaw began to disappear rapidly. The proptosis entirely disappeared after the third dose, and the man wanted to go out of the hospital and back to work again, which, when it was safe, he was permitted to do. I reported the case to the College of Physicians at the time. Two months later, he returned to the hospital with a marked syphiloderm all over the body. Then there was a very positive Wassermann reaction. The man was then placed on mercurial treatment. The general lesions disappeared, and he has been well since. He was kept under observation for a year or more.

Dr. A. E. Davis, New York City: Some of these cases take enormous doses with no reaction; while in others the smallest dose is enough to produce a reaction. A young girl, seventeen or eighteen years of age, had a keratitis and iritis, and reacted to the old tuberculin in all three reactions, local, focal and general. We began treatment with the bacillus emulsion, one minum. When she got the fourth dose, there was some reaction. The fifth caused her temperature to rise to 105°, and her pulse, to 100. There was swelling of the tonsils,



the parotid glands were involved; and she reacted all over. They sent to me from the hospital, thinking that she had pneumonia; but after ten days, she came back to normal. Subsequently, we could not go above two minims. The inflammatory process subsided in a few weeks, and she has been well for a year and a half.

I have had one patient under treatment for five years. It was a case of choroidal tuberculosis, in which one eye had been lost. The patient had been treated for syphilis for a number of years before coming under observation. There was an active choroiditis. In the fourth year, he stopped the treatment for two months, and had a recurrence of the trouble. He was put back on the treatment, and is still on it. He gained thirty-five pounds on the treatment. He maintained that weight until he stopped it. Then he began to go down, to lose flesh and to have flashes in the eye. As to the form of tuberculin, I am like Dr. Weeks in preferring old tuberculin.

Dr. Hiram Woods:—Dr. Theobald Smith, in an article upon Vaccine Therapy, answered a number of the questions which Dr. Weeks has brought up; for instance, as to the possibility of harm coming from tuberculin. He emphasized the fact that tuberculous troubles in general medicine have "Hands off" written all over them, so far as tuberculin is concerned, when there is fever or any sign of an active process going on. In localized tuberculosis, to which ocular tuberculosis would belong, so long as there exists evidence of acute inflammatory disturbances, you are more apt to do harm than good by the use of tuberculin. But the place for tuberculin is in what he calls the residual tuberculous infection, cases that hang on and relapse from time to time.

I have reported cases in which I believe that harm was done. One patient was a woman who got too much tuberculin, I know now; altho the dose was smaller than they are giving today. She had an old atrophic process in one eye; and in the other an acute process. I gave one milligram of old tuberculin. There were, within twenty-four hours, the elevation of temperature and pain,

and a definite reddening of the area near the point of an old exudate. Her vision was reduced from 20/40 to 20/200, and never got better.

I saw a girl with a choroiditis in the periphery. She had a large area of exudate near the fovea. She had, after the injection of 1:1000 milligram of old tuberculin a fresh return, which did not reach the fovea. That healed up, and she got well.

I have a patient who, for six years, has been taking moderate doses of tuberculin, very small doses; but when the tuberculin is stopped, her flashes begin. She falls off, becomes nervous and fidgety, and is almost like a person without dope who is dependent on it for comfort and welfare. Also, after she has been two months without tuberculin, she will develop those symptoms that we see with a mild choroiditis.

Dr. Byers:—It is my conviction that tuberculin treatment is a two-edged sword, and that it is not likely to be given with benefit by men who have not previously studied the question. It would be better, in the great majority of instances, for men giving tuberculin to associate themselves with practitioners who make a specialty of treating tuberculous cases. I have never seen harm follow a tuberculin reaction. On the contrary, I have always noted that it did good. There are, however, many instances on record where a tuberculin reaction has done harm; and one should proceed, for this reason, very cautiously.

Chiefly as the result of an experience of my confrere and colleague, Dr. Tooke, we now consider that one milligram as an initial dose is too high. A quarter grain dose, in a woman of twenty-six gave a decided local and focal reaction. There were records of eyes distinctly tubercular on microscopic examination that failed to react to tuberculin. If a supposedly tuberculous eye does not react favorably to tuberculin treatment, a reconsideration of the diagnosis is necessary. It is my belief that in tubercular eyes, properly given, tuberculin seldom, if ever, fails to do good.

Dr. Woods has brought up the point of the danger of treating these patients with tuberculin, especially acute cases.



My confreres at Saranac Lake, with whom I have been intimately in touch in all my practice, and my brother, lay very great emphasis on the importance of allowing cases to come into a more or less chronic condition before tuberculin treatment is instituted; taking advantage of the interval to build up the natural combative forces of the body by the usual hygienic measures, such as good feeding, rest, fresh air and the like. My own preference is always for the bacillary emulsion; and we lay a great deal of stress on having it freshly prepared and, of course, on methods of sterilization.

Dr. Edward Jackson, Denver, Colo.:—I have a distinct preference for the old tuberculin for therapeutic, as well as diagnostic uses. Another point that I believe is extremely important, and not generally appreciated is that enough time should elapse between doses. Not only should tuberculin not be used in relatively acute cases, the changes that are produced by one dose of tuberculin should pass from the acute to the chronic condition before the dose is repeated. My rule is not to give the dose oftener than once in two weeks, to start with; and not more than once in one week in any case. Some cases have done better with three or four weeks between the doses, than with the two weeks' interval.

With reference to the time of treatment, I think that these cases must be watched, and often treated from time to time, as long as they have tuberculosis; and with some, that will be as long as they live. I have now a patient that has been treated for seven years, taking tuberculin doses for a considerable part of that time. Within the last year, she has had a recurrence of kerato-iritis. Another case has now been treated for five years. The patient came to Colorado fifteen months ago with a recurrence. I want to emphasize the importance of a point that Dr. Byers alluded to, the general treatment of the case along the usual lines of treatment for tuberculosis. It is impossible to get good results without attending to that.

Tuberculin can produce permanent harm. In one case of intraocular hemorrhage in connection with disease of

the retinal vessels, I saw, on two separate occasions, fresh hemorrhages following within forty-eight hours of the dose of tuberculin. In other cases, I am sure that there has been some aggravation of the symptoms after what were, for them, excessive doses; although comparatively small doses as ordinarily estimated.

Dr. S. Lewis Ziegler, Philadelphia, Pa.:—Some twelve years ago, I presented a case before the Society, of tuberculosis of the cornea, which I had treated by repeated doses of old tuberculin. I fully agree with the view that the old tuberculin is the best tuberculin to use. As to the length of time and the dosage, I think that small dosage is certainly of the greatest advantage. The interval, as a rule, has been one week. The lesions that I have seen, in upwards of fifty cases, have been mostly in the cornea and sclera; and I remember one very marked case of choroidal disease that passed on to cataract.

In most of the cases, there was a marked early reaction. That reaction was soon dissipated, and the cases passed on, after that, without reaction. But the injections were continued for a long time, so as to be positive that the lesion had been eradicated. In regard to the co-operation with the general practitioner treating tuberculosis, it is somewhat difficult for the specialist to co-operate, for the reason that the majority of internists are very skeptical with regard to the use of tuberculin for this purpose. They are almost antagonistic to its use.

Dr. F. H. Verhoeff, Boston, Mass.:—Eleven years ago, I was a strong advocate of tuberculin treatment for chronic ocular tuberculosis; but I have changed my views entirely since then. My earlier conclusion was based on the lack of clinical experience. I thought that when we had a case of chronic ocular tuberculosis, it would do badly if left alone. But the fact is that the majority of cases do well, and it is only the exceptional case that does badly. I treated cases with tuberculin and they did well, and I thought that it was a remarkable remedy.

But since then, I have had more experience, and find that in the very bad cases, in which you want tuberculin to

do good; it utterly fails. In the cases that are getting worse, it perhaps makes them worse. I abandoned the use of tuberculin, and found that the cases did well under simple hygienic measures. The most important thing is rest.

I think that tuberculin, for diagnostic purposes, is seldom necessary, now that we know the clinical picture of tuberculosis. It is unnecessary in the vast majority of cases. Occasionally you get a case in which you are not sure of the diagnosis, and you can then use it. I suppose that damage is done occasionally. I have not seen bad results. I have seen metastases occur in the cornea and, in one instance, a small distance from it, evidently due to the tuberculin reaction; and I should suppose that it could occur in the fundus also, where it would do more harm. I do not say that tuberculin may not hasten some of these very sluggish cases of tuberculosis, by getting a reaction and subsiding just a little more quickly; but it is splitting hairs to determine that point. Personally, I have become convinced that there is no use in running any risk by using tuberculin; so I have entirely abandoned it.

Dr. Weeks, closing:—The majority of cases in which I find the use of tuberculin necessary are progressive cases. The theory, of course, in regard to the bad effects of tuberculin in acute general tuberculosis, is that the system is so domi-

nated by the toxins of tuberculosis that it has not the power to produce antibodies to combat these toxins; and that the system must be allowed to recover that ability, if it will, to make tuberculin of any value.

When we have tuberculosis of the eye, we have, as a rule, a localized tuberculosis process. Under such conditions, the system is not so saturated with toxins that antibodies cannot be formed; and the accepted theory is that the antibodies are formed and these toxins are combated. So I can hardly see any reason for saying that a tuberculous process must be inactive, in order that it may be influenced by tuberculin.

The last speaker has stated that the use of tuberculin does not seem to be of great value. I have had three cases referred to me for enucleation, advised by the people who sent them to me; and the patients have at present very good eyes, because the careful use of tuberculin was persisted in. The remark that it was splitting hairs to differentiate between the cases puts me in mind of a remark of one of my old teachers, that I must not split hairs in determining refraction. But it was just that hair-splitting that was of value to me in establishing me in the practice of ophthalmology. I think that the splitting of hairs in a thing of this kind is what we all should do.

*(To be continued)*

## ABSTRACTS

**Hine, M. L.—Recovery of Fields of Vision in Concussion Injuries of the Occipital Cortex.**—Brit. Jour. Ophth., v. 2, p. 12.

For many reasons it is not often possible to make daily examinations of the visual fields of patients with recent occipital injuries during the period of recovery. Hence the writer considers it will be of general interest to record the results of such examinations obtained during the past few months in a

large base hospital camp in France, where he was able to watch during the recovery period at least five patients, amongst many others with head injuries, who had occipital lesions which could be classified under the heading of "concussion injuries." Three of these had fracture of the skull and were seen at operation to have either subdural or extradural blood clot with the dura itself intact; the other two had scalp wounds in the occipital region, but no demonstrable fracture.



Hine gives the histories of these patients with diagrams, showing the location of the external injury, and of the fields of vision. Tho the cases are few in number, they suggested certain conclusions, some of which had been reached recently by Lister and Holmes. These are:

1. In the case of an injury at or near the occipital pole the hemianopia is very frequently complete, there being much less frequently macular escape than in the majority of cases with lesions (chiefly vascular) producing hemianopia, met with in civil practice. This is explained in the paper by Lister and Holmes as being due to the situation of the macular area in the cortex at the posterior end of the calcarine fissure, by the occipital pole, each half of the macula being represented on one side only, the right half of each macula in the right cortex and the left half in the left. The more usual escape in civil practice is attributed to an overlapping of the arterial supply by the posterior and middle cerebral vessels.

2. The visual fields are gradually restored by recovery from center to periphery. It may be noted that a scotoma caused by loss of cerebral substance gradually contracts from periphery to center as the surrounding edema of the brain subsides.

3. The field of vision usually returns in the upper quadrant before the lower, and, in the writer's experience, never vice versa, this being due to the fact that all the injuries recorded here have been above the occipital pole, which is situated as a rule about one inch above the inion. Hence, the occipital cortex above the calcarine fissure, which represents the lower part of the field of vision, has borne the brunt of the blow. Any injury below the occipital protuberance is much more likely to be fatal, owing to injury to the cerebellum and medulla.

4. The restoration of function at first is incomplete, but when once it has commenced it seems to proceed in a definite order—color perception coming after the perception of white, even tho the colored object is the larger,

and, as recovery takes place the appreciation of colors becomes more and more acute, so that small colored objects can be distinguished further and further away. By this means, in suitable cases, one can roughly measure, for clinical purposes, the recovery of function in the macular region.

5. Hence it is necessary when suspecting occipital cortical injury, to use small colored test objects as well as white, or else a partially recovered lesion may be missed, or lesser injuries to the cerebral cortex of the occipital lobe may be overlooked.

6. On the other hand, in the more slowly and steadily recovering cases with subdural or extradural hemorrhage, there would seem to be no such separation between color appreciation and appreciation of a white test object. This could be explained by supposing a less severe injury to the macular area, while only a careful comparison of the color fields from day to day could show whether they increased proportionately to the fields for white. Such examination would, however, in most cases be impossible or unreliable on account of the patient's condition.

C. H. M.

**Tillot. — Traumatic Ulceration of Cornea, with iritis, treated with dionin. —** *La Clinique Ophtalmogique*, v. 22, p. 451.

This is a report of the personal observations of the author upon himself. Some powdered tin chlorat accidentally fell into Tillot's eye. The pain was intense; and despite immediate flushing, cocain and hot applications, the chemosis became most severe. Finally the cornea was denuded, superficial vascularization occurred, with loss of substance, iritis with synechia. Vision was reduced to inability to count his own fingers. This continued despite treatment, and on the twenty-fourth day the instillation of  $\frac{1}{4}$  per cent dionin was begun, twelve times daily. Immediate improvement resulted; and six weeks later, the vision had returned and only a faint vascularization could be seen with oblique illumination.

J. S. W.



**Fuchs, E.—Anatomy of Some Congenital Anomalies of Retina and Optic Nerve.**—*Graefe's Arch. f. Ophthalmol.*, v. 93, p. 1.

#### ANOMALIES OF THE RETINA.

Fuchs refers to the anomalies, which Seefelder and Lindenfeld discovered in the pars optica and pars ciliaris of the retina in fetal eyes.

Fuchs studied not fetal eyes, but eyes more developed, one of a child of 7, one of 8, one of 14 years, and 4 of adults. The 4 first mentioned had been enucleated on account of recent injuries; the others were taken from the corpse. Fuchs reports of pars optica:

1. Rosettes were not found in any of the specimens.

2. Folds of the retina were met with in case 1 and 3. These when found were incomplete, consisting partly in foldlike processes of the retina with atypical structure, partly thru a forward intrust of the external layers. Fuchs found three of the first, and two of the second character.

3. Of cysts only one instance was met with in Case 1. It was situated in the temporal half, in the equatorial region. Its structure was more complicated than the one described by Seefelder. The inner space of the cyst was slightly oval; the surrounding layers of the retina were somewhat thinned. The inner wall of the cyst was formed by cells that resemble the cells of the outer nuclear layer. Within the cavity of the cyst there are a number of large very pale cells that resemble epithelial cells where they are packed closely. They are filled by small, irregular, slightly luminous corpuscles. Whether they are due to fatty degeneration or whether they are cells of the pigment epithelium, whose pigment has faded, is an open question.

4. Irregular growth and hypertrophy of the pars optica was met with in a number of the cases. In one instance the ora serrata reached farther forward than in normal eyes, the distance from the iris angle being 4 mm. temporally and 3.3 mm. nasally against 5.6 and 4.6 mm. in normal eyes.

5. An anomaly not mentioned by the previous authors, is a thinned portion of the retina. Fuchs found two instances of this condition. The thinned retina is reduced to one-sixth of its normal thickness. These areas were located in the equatorial region, in different meridians.

**PARS CILIARIS.**—1. Hypertrophy of the cylinder cells was seen in quite a number of the cases. The findings resembled very closely those found in fetal eyes.

2. Just as frequently areas were encountered, where the ciliary epithelium contained more than one row of cells; in some instances four or five rows of nuclei were present.

3. Fuchs discovered the presence of "islands of atypical retina within the pars ciliaris." In 3 cases, instances of this anomaly were found. They were quite numerous in each of the specimens. Fuchs gives the following description: Within a small space the row of epithelial cells is replaced by a piece of atypical retina, which consists of a network of glia, filled irregularly by nuclei. This piece of retina is considerably thicker, than the ciliary epithelium. It is also larger in area; and, in order to find room within the smaller space of the epithelium, it is folded. It appears, therefore, like a fungus with a strangulated base.

#### CONUS FROM THE PAPILLA DOWNWARD.

In 1913 Tertsch collected seven cases, one his own, where a downward conus had been found ophthalmoscopically and where afterwards an anatomic examination could be made. Fuchs adds to these, three cases; and gives a minute description of the findings.

In the first case the ophthalmoscope revealed a white conus downward and slightly inward, about half as wide as the papilla. The latter itself was oval and was rounded by the conus. Distribution of the blood vessels is somewhat irregular, and the excavation of small degree. The eye is of normal size and shows a slight bulging of the sclera in the lower half. The optic nerve enters the eyeball obliquely from

below upward. Within the scleral canal it makes a sharp bend in the opposite direction, so that its axis forms an angle that opens downward. The sclera is of normal thickness. The nerve fibres are also normal. Below the optic nerve the sclera is bulging. The anterior portion of the lower wall of the scleral canal, down to the place where the choroid commences, must appear ophthalmoscopically as a white conus.

In the second case the width of the conus was one-third that of the papilla. There was also a bulging of the sclera below the entrance of the optic nerve. As the latter had been severed very close to the eyeball, nothing can be stated on the direction of its insertion. Above the edge the scleral canal and the choroid project; below they are flattened.

In case 3 the conus was the smallest. The eye was of normal size and the sclera did not bulge. The optic nerve entered the sclera perpendicularly. Above its entrance the scleral canal and the choroid project as in the second case, but to a less degree; below they are bent and flattened.

The changes found by Fuchs are similar to those found by previous authors. The width of the conus is proportional to the degree of the changes around the optic nerve. If the latter are small, the form of the eyeball is normal; if larger, the sclera bulges below the papilla. This ectatic area of the sclera is thinned and in some instances also the choroid and the retina are found thinned. The pathologic findings in cases of conus downward are identical with those in temporal conus. Both are the result of the ectasia of the sclera. The term coloboma is therefore inappropriate. But the important difference between temporal conus and conus downward lies in the fact that the former commences during life and is frequently progressive, whilst the latter is congenital and stationary. It is also frequently complicated by other congenital anomalies,

and in nearly all the cases astigmatism and impairment of vision are present.

#### EXCRESCENCES OF RUDIMENTARY RETINA AT THE EDGE OF THE PAPILLA.

These excrescences are irregular lobules, which consist of mesodermal glia, nerve fibers and elements of the retina. They grow from the optic nerve within the scleral ring or immediately after its exit. Of elements of the retina those of the nuclear layer are most frequently found, embedded in a network of glia. Fuchs divides the cases into two categories: Excrescences that grow on the inner plane of the sclera under the choroid and excrescences that grow backward into the optic nerve, into the subdural space or into the sclera. Of the first category there are 11 cases on record, 7 of the author's: Of the latter 9 cases (1 of the author's). With one exception the direction of the excrescences under the choroid was a downward one. They are generally pedunculated while the excrescences backward occur in the form of a finger.

#### STRAY OPTIC NERVE FIBERS.

Fuchs distinguishes two kinds of stray fibers of the optic nerve: 1. Isolated bundles of the uncrossed portion of the nerve, and secondary nerve fibers that leave the nerve and lose themselves in the surrounding connective tissue.

Four cases of the first kind have been described previously. In one there was found a bundle of nerve fibers, which originated in the corpus geniculatum, ran forward along the optic tract and the chiasm and finally joined the optic nerve at its temporal side. In another, the anomalous bundle also started from the corpus geniculatum and finally entered the optic nerve on its temporal side. In a third it separated from the nerve immediately behind the eyeball. In the fourth the bundle left the main trunk somewhat farther behind the ball and joined the chiasm. The case reported by Fuchs belongs probably to this category.

# American Journal of Ophthalmology

Series 3, Vol. 1, No. 11

November, 1918

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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## WIDER USE OF THE TONOMETER.

Readers will find in our last issue the abstract of an interesting paper by Dr. Morax, of Paris, relative to some atypical initial signs of subacute glaucoma. This paper is timely and demonstrates how even an acute observer could have been misled, and make a faulty diagnosis of a "neuropathic condition," when in reality a beginning glaucoma was at the root of the trouble. The use of Schiötz tonometer changed absolutely the trend of events, and permitted a correct diagnosis to be established and a proper therapy instituted.

The two uncommon initial symptoms which Dr. Morax describes, orbitofacial pain and lacrimation without lesion of the lacrimal passages, altho certainly worthy of careful consideration, would have been of little value by themselves in establishing the diagnosis, but for the tonometric examination which made evident the condition of the intraocular pressure.

Dr. Morax has rendered a good service to the profession in calling attention to the necessity of a widespread use of the tonometer, when obscure symptoms may be traced to an increase in the ocular tension, but we may go further and state that after the age of 40 years, in every patient subjected to a thoro eye examination, the intraocular tension must be taken as much as a routine examination as the blood pressure is nowadays ascertained.

A wider use of the tonometer is a real necessity and will make clear the diagnosis in many obscure cases. It is to be hoped that such a good instrument will find its way into a more general use.

Perhaps some ophthalmologists may question if the high readings of the tonometer in the absence of any other of the common symptoms means glaucoma, and if Morax is justified in performing an iridectomy when vision is normal, pupils normal, visual fields intact and no excavation is present in the disc.



The writer as far back as 1901 tried to emphasize the importance of a clear distinction between hypertension and glaucoma. Hypertension is a common symptom for both primary and secondary glaucoma; but it is only indicative of the former when no other disease, inflammatory or mechanical, exists in the eye. If there is no history of eye trouble and if we do not find on careful examination any disease, secondary glaucoma can be fairly discarded. Still, it is necessary to have in mind and to search closely for deposits on Descemet's membrane. There are some border line cases between serous iridocyclitis and glaucoma in which only repeated and careful examinations of the iris and cornea can settle the diagnosis.

We may safely assume that if no secondary glaucoma, inflammatory or mechanical, exists, and if the examination with the tonometer shows an increase to more than 30 mm., we are dealing with a case of initial primary glaucoma.

In former times we relied on the subjective symptoms of transient blurring of vision, colored halos, slight dilatation of the pupil, and on the objective signs of shallowness of the anterior chamber and hardness of the eyeball on palpation, to make the diagnosis of prodromic glaucoma. But prodromic symptoms mean an impending or actually commenced attack, altho only of a mild type. If these early symptoms did not exist we were entirely at a loss to make a diagnosis of glaucoma. Even the palpation with the fingers was deficient and sometimes misleading.

In simple chronic glaucoma the cupping of the disc and the nasal contraction of the visual fields were our better diagnostic signs. Now, happily, we have in our possession a good instrument with which our diagnosis of hypertension is readily made and its degree accurately measured. The perfection and usefulness of the Schiötz tonometer is made clearer when the tension is taken periodically and we are able to detect the changes produced by treatment.

In Morax' cases the use of miotics relieved not only the increase of tension but also the orbital and facial pains and the lacrimation, showing these symptoms were due to a glaucomatous condition.

The writer has now under treatment a patient, a one-eyed lady, 74 years of age, who complained only of failing vision. Examination of the fundus showed some changes of the refraction in the cortex of the lens, which were not considered sufficient cause for the failing vision. Papilla was not excavated; tension to fingers doubtfully increased. The tonometer showed a tension of 39 mm. Miotics increased vision from 1/2 to normal, but the tension only subsided to 21 mm. after some weeks.

I certainly consider iridectomy perfectly justified in cases in which even in the absence of the classical symptoms, the tension does not decrease to normal with the use of miotics, or if relapses of high tension occur. At this stage of the disease there is probably no adhesion of the root of the iris to the cornea, an increase in the albuminoid contents of the aqueous and vitreous, which makes filtration difficult and produces an edematous condition of the vitreous by the accumulation of colloid products being only responsible for the high tension.

It is to be regretted that we have not yet an instrument at our command which enables us to observe if the root of the iris is free, if the normal angle of the anterior chamber is preserved, or if a new angle has been framed by adhesion of the root of the iris to the cornea. In the former case we may have the chance to wait and use miotics and general treatment; in the later iridectomy will be absolutely necessary to prevent the adhesion becoming permanent and entailing a complete loss of the eye.

Not only in cases of primary glaucoma are tonometric examinations of great value as a routine practice; but in many other diseases accompanied by hypertension its use is highly serviceable from the point of view of treatment. Marbaix (*Ann. d'Oculist*, 155, p.

27), has lately insisted on the importance of systematic examination of the tension in cases of interstitial keratitis, scleritis, anterior choroiditis with vitreous opacities, iritis, high myopia and retinal hemorrhages. In a case of interstitial keratitis in which a prolonged use of atropin seemed beneficial, a dilatation of the pupil having been obtained, Marbaix found  $T. = 70$  mm. The patient complained of cephalalgia, which entirely subsided with the discontinuance of the mydriatic.

In a case of diabetic iritis a tension of 50 to 70 mm. was not attended with any pain; still the vision had lowered to  $1/3$  to  $1/10$ . General treatment and miotics made the tension decrease to 30 to 40 mm. The author waited only for a diminution in the quantity of sugar to perform an iridectomy.

The "atropin cure" frequently prescribed in young myopes may be dangerous, he asserts, if the tension is not examined beforehand. In a case of high myopia, tension had raised to 70 mm. and severe headaches were present. An increase of myopia can be produced by such augmented intraocular pressure.

M. URIBE-TRONCOSO.

## OCULAR LESIONS OF INFLUENZA.

These are extremely varied in character; and they occur largely as sequels, so that the interest of the ophthalmologist in the present epidemic is rather prospective. Those whose practice includes ear, nose and throat work, will meet relatively few of the eye lesions during the height of the epidemic. Later it will be demonstrated that many widely different conditions are traceable to this cause. The proportion of patients suffering from influenza, who have eye lesions, is really small. But so large is the number of persons affected in one of these epidemics, that the aggregate of the ocular lesions is quite important.

The influenza bacillus of Pfeiffer closely resembles the Koch-Weeks bacillus. Some observers have suggested that they might be identical. But the

wide difference in the clinical manifestations of their pathogenic powers, negatives any such supposition. Either may produce a conjunctivitis, but there the resemblance ends. The clinical picture of acute contagious conjunctivitis is characteristic and fairly constant. That of influenza conjunctivitis differs from the former, even in its nearest approaches, and varies in its clinical features; and the other ocular lesions of influenza are practically unknown in connection with acute contagious conjunctivitis.

The influenza bacillus forms a toxin that shows a powerful affinity for the whole nervous system. In this respect it most nearly resembles the diphtheria bacillus. In connection with the eye, the effect of such toxin is manifest in spasm or paralysis of the accommodation, paresis or paralysis of the extraocular muscles, photophobia, transient amblyopia, optic neuritis, optic atrophy, neuralgic pain apparently not caused by local lesions; and persistent asthenopia, from which the patient may recover after several months or even years.

Altho few young children may suffer from influenza, the conjunctivitis caused by the influenza bacillus occurs mostly in children under one year old, and sometimes in the newborn. In the latter it may closely resemble a gonococcus infection; or it may be pseudomembranous in character. Even in such cases it is not usually attended with serious general symptoms; and the mass of cases are mild without notable corneal involvement.

Often the first symptom is swelling of the upper lid. But this may occur in cases of influenza in which no conjunctivitis arises. Spriggs (Ophthalmoscope, 1909, p. 505) reported an epidemic in which the cases began with swelling of the lids and conjunctiva, but without discharge. In 24 hours this was followed by headache; and in half the cases this constituted the whole of the attack. In others the symptoms of influenza ran the usual course.

It would be reckless to state of any form of ocular inflammation that it

does not occur as an effect of the influenza bacillus; but it is certainly very unusual to see corneal ulcer or sloughing as an extension of conjunctival inflammation. The more common corneal lesions are herpetic or dendritic ulcers, of neuropathic origin. A deeper corneal inflammation may be associated with uveitis. These conditions commonly arise after the general symptoms of influenza have run their course. But they may yield promptly to a specific vaccine.

Uveal inflammations associated with influenza show great variety. The most violent panophthalmitis with terrific pain, going on to the rupture of the eyeball in a few days, has been seen. On the other hand there may be a low-grade chronic inflammation, without any acute symptoms, that proceeds ultimately to shrinking of the eyeball. The ocular disease may be metastatic in origin; but has arisen from infection of operative wounds of the eyeball. An eye previously blind and degenerated may take on acute inflammation thru influenzal infection. The vitreous seems to offer an especially favorable culture medium for the influenza bacillus, so that in the cases of panophthalmitis it is apt to give an abundant culture of the organism.

The tendency of influenza to leave chronic infection of the nasal accessory sinuses, and focal infections elsewhere, is responsible for some of the uveal infections. But it is still more likely to cause trouble in the orbit. Orbital inflammation from influenza, either cellulitis or abscess, may be one of the primary manifestations of the disease; altho it often begins to attract attention only when the general symptoms are on the decline. It may also arise from inflammation starting in the eyeball, and has followed infection of an operative wound of the eyeball or orbit. But probably the greatest number of these cases have arisen after general recovery from the influenza, in connection with the sinus disease that has remained as a sequel of influenza. It is liable to involve any structure in the orbit. The eyeball, the ciliary ganglion, the muscles and the optic nerve

have all been damaged in such orbital disease. Prompt treatment is indicated, including free drainage of the orbital abscess and of the affected sinuses.

The optic nerve is perhaps more likely to suffer from influenza than any other part of the visual apparatus. A condition simulating toxic amblyopia has been reported, as attending the influenzal attack; and retrobulbar neuritis, with some visible alteration of the nerve head has been recognized in other cases. These conditions may affect one or both nerves, and may end in partial or complete recovery. In a smaller proportion of cases, the result is severe or complete optic atrophy. This latter termination is more likely to occur in cases caused by sinus disease and may become an indication for opening the sinuses, even in the absence of positive, local or X-ray evidence of the sinus disease.

In the retina, Knapp (*Arch. of Oph.*, v. 45, p. 247) saw a star shaped figure, such as is connected with albuminuric retinitis, associated with an optic neuritis, and disappearing with recovery from the latter condition. Thomas and Coats reported (*Trans. Ophthalmol. Soc. of United Kingdom*, v. 31, p. 149) a case of granuloma forming in the retina near the optic disc, and followed by detachment of the retina. The eye became blind and painful and was enucleated. Glaucoma, in which the first inflammatory attack accompanied or followed shortly after influenza, is not very rare. Cases of senile cataract are apt to show marked increase of the lens opacity with or shortly after an attack of influenza. In some of these cases some clearing occurs subsequently; in others the progress seems accelerated from that time.

From a review of previous experiences with influenza, it seems sure that some ophthalmologists will be consulted during the height of the epidemic with regard to certain complications arising during the influenzal attack, especially acute conjunctivitis, swelling of the lids, metastatic ophthalmitis, orbital cellulitis, and optic neuritis. But after the epidemic has



largely passed, there will come under observation a greater number of cases, in which the ocular condition must be regarded as a sequel to the influenza. During the prevalence of the disease the danger of infection of operative wounds should be borne in mind, and operations should be deferred, if this is possible without serious disadvantage to the patient. E. J.

### ARTIFICIAL EYES VS. PATRIOTISM.

A short time ago a number of ophthalmologists in this country received letters from a manufacturer of artificial eyes; requesting that they use their influence at Washington to induce the Government to allow this manufacturer certain special importation privileges with Germany, to enable him to manufacture the same quality of eyes he had previously been in the habit of making.

The manufacturer in question received several communications from ophthalmologists of this country indignantly protesting against such a petition. He probably appreciates by this time, that the loyal physicians of this country are in no mood to have anything to do with the Central Germanic Powers, except to defeat them unconditionally; and then to endeavor to assist them in becoming decent citizens of a decent world.

The Germans are undoubtedly an intellectual and scientific race of people. They have devised many things from which they have acquired a practically exclusive trade. Medical men have depended upon Germany for certain

drugs, dyes, appliances, etc. Inasmuch as such articles could be purchased from Germany and were of superior quality and cheap, Americans have purchased them and have used them with satisfaction. But there is really no reason why all these things cannot be produced at home, and as a matter of fact they *will* be produced at home, and all we need to do is to realize that they *must* be manufactured in this country; and before long this object will be attained. It is up to us, therefore, to learn to be independent and to make what we need here in the United States and then to protect our own industries. Let all chemical and other manufacturers, therefore, realize that they are facing this problem and must conquer it. Until this condition of affairs is reached, however, let us cheerfully go *without* those articles we have previously imported from Germany, but which we have not yet learned how to produce.

It is not profitable at this time to indulge in expressions concerning the Central Powers of Europe. Paper is too expensive, and we must learn to conserve our nervous and mental energies. It is desirable, however, to urge ophthalmologists to emphatically decline the subtle and dangerous invitation of the before mentioned manufacturer of artificial eyes, to plead for special privileges of German importations; and to patriotically abstain in the future from depending upon new German made goods, until such time as Germany has become a decent neighbor with whom to live, and do business, and it is an easy guess that this will not be for many, many years.

F. A.

## BOOK NOTICES

**HYGIENE OF THE EYE.** By William Campbell Posey, A. B., M. D., Professor of Diseases of the Eye in the Philadelphia Polyclinic. 8vo., 354 pages, 120 illustrations. Philadelphia and London, J. B. Lippincott Co. Price \$4.00 net.

The ophthalmologist will feel the greatest interest in this work on account of the four chapters that have been contributed to it by scientific specialists who are not ophthalmologists. The first of these, Chapter VII on "Artificial Lighting," is written by the illu-

minating engineer, Herbert E. Ives, Ph. D., whose original contributions on the subject are among the most important that have appeared in the literature of the last two decades. It is hard to conceive of a more satisfactory, concise, clear presentation of this subject than has here been made in these 16 pages.

The next chapter of 10 pages on "Daylight Illumination of Rooms and Buildings from an Architectural Standpoint," by William Copeland Furber, architect and consulting engineer, is far less satisfactory largely because it deals with a subject that is yet to be developed, which has received but little careful consideration as compared with the subject of artificial lighting.

The third of these chapters is chapter XIX. "The Blind. Blindness from an Economic and Social Point of View. The Education and Employment of the Blind." It is by O. H. Burritt, M. A., Principal of the Pennsylvania Institution for the Instruction of the Blind, Philadelphia, Pa., and deals with a subject with which every one in active ophthalmic practice should be familiar. It is a subject that is developing very rapidly just now; and this resumé in 44 pages, of what has been done, furnishes an excellent basis from which the wide awake ophthalmologist can begin his acquaintance with problems that are being rapidly developed and solved at the present time.

To every one of us comes the necessity of explaining to the patient and his friends that useful vision for the ordinary affairs of life is for him a thing of the past. In presenting such a situation we should be ready to present with it the possibilities which reeducation and readjustment to new conditions now offer to the blind. This chapter, including the history and statement of what has been achieved for the blind, can be read with profit by every reader of this journal.

The last of these chapters, 5 pages, on "The Popular Movement for Conservation of Vision," is by Edward M. Van Cleve, Managing Director of the

National Committee for the Prevention of Blindness, and briefly reviews this movement.

Turning to the chapters written by Dr. Posey, the one dealing with "Wounds and Injuries" will be of greatest interest to the ophthalmic surgeon. In its 40 pages, the subject is approached from the side of causation and prevention; in a way that supplements the discussion of the subject in most text books on ophthalmology. In this chapter the pictures showing the X-ray localization of a foreign body, and its extraction with the giant magnet, seem to have very little connection with the text, and to be rather out of place. Even the "General Practitioner," to whom the book appears to be especially addressed, can hardly be expected to learn much from the pictures with description; and for the laymen, who are also expected to read this work, it seems like an approach to cheap sensationalism.

Some such criticism might also be offered with regard to the introduction of the account of the ophthalmoscope, its history and use, in Chapter II; with a colored plate purporting to show two normal and four pathologic conditions of the ocular fundus. But in justice to the author it must be borne in mind that there has always been a disposition to introduce just such material of doubtful appropriateness into popular works on hygiene. We know of none that is free from this kind of "padding." Something, too, might be said of meeting the curiosity of laymen in regard to such matters. The tendency of knowledge to diffuse itself is as general as the tendency to physical diffusion of gases. It rests on the universal curiosity of the human mind; and the equally general disposition of humanity to tell what one knows. This may account, too, for the special chapters on Cataract and Glaucoma.

Among the other excellent chapters of this book, the one on "School Life and Care of the Eyes," 28 pages, is especially worth reading. The general practitioner may profit, too, by the one on "The Participation of the Eye in Diseases of the General System," 28

pages; and the one on the "Effect of Certain Beverages and Drugs."

The book is well illustrated thruout, and most of the illustrations are not open to the criticism offered above. They help to render clear the thought, and generally in less space than would be required to give as good an explanation in printed words. On the whole it is a valuable contribution to a literature that should exert a greater influence on the thoughtful, and should be more widely read.

E. J.

**TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE AMERICAN MEDICAL ASSOCIATION.** Annual Session, June 10 to 14, 1918. 8vo. 317 pages. Illustrated. Chicago A. M. A. Press. Price \$1.00, by subscription.

In former years all the papers read before the section on ophthalmology were published in the Journal of the American Medical Association, so that every Fellow of the Association received a copy. "This is no longer the case. In the present volume appear papers that have not been published in the Journal, including some of greatest interest and value to the ophthalmologist. This, of course, increases greatly the value and importance of this volume. It was worth its price before, simply because of the convenience of having these papers collected, bound, and indexed for ready reference. Now some of the papers and discussions can only be obtained thru this publication.

Even the preessional volume, sent to members of the section, has but a fraction of the value of this volume. It does not contain some of the addresses and reports made to the Section; and it contains none of the discussions excited by the papers, often more valuable than the papers themselves. The paper represents the experience and views of one member, often obscured by overelaboration, and the introduction of matter of secondary importance to make the paper "complete." The discussion may give the experience

and conclusions of a half-dozen equally competent men, compressed and freed from extraneous matter, by the requirements of the five minute rule under which the discussion is carried on; and the restriction to five hundred words in the revised stenographic report.

As with all other publications issued by the American Medical Association Press, this volume is carefully arranged and proof read, neatly printed on good paper and substantially bound. The illustrations, too, are clearly reproduced, and mostly they add substantially to the value of the papers in connection with which they appear. What we have said of this series of volumes before is now more than ever true; it is a series that no American specializing in ophthalmic practice can afford to do without.

E. J.

## CORRESPONDENCE. FILARIAL TUMORS.

*To the Editor:*

I read with great interest under "Editorials" in the August issue of THE AMERICAN JOURNAL OF OPHTHALMOLOGY, some suggestions upon "Ocular Lesions from Filaria and Allied Parasites." The importance that you assign this line of investigation pleases me very much. I am also of the opinion that the parasites must be exactly determined by an expert zoologist. Some weeks ago I forwarded specimen tumors to Prof. Henry B. Ward and look for his answer in the near future.

Meanwhile, the object of these lines is to fortify the opinion that the parasite that causes the changes described in my paper, "Disturbances of Vision in Patients Harboring Certain Filarial Tumors," (AMERICAN JOURNAL OF OPHTHALMOLOGY, February, 1918, p. 122), is not by any means the *Filaria bancrofti*, nor is it a near species; but certainly belongs to the genus *Onchocerca*, and probably to the species *Onchocerca volvulus*, Leuckart, 1893, or to a nearly related one. This would not be strange because of the fact that negroes from Africa worked once in the lands now infested.



These views are based on the studies of my distinguished cooperator Tácito Molina Izquierdo, to whom I am indebted for the report that I add to this letter.

For my part I have to say: that I have continued my clinical investigations. Since I published my paper, I have examined one hundred more cases; and of this further study, I have nothing more to add to the description, and I hold today it is perfectly certain that patients that have tumors in any part of the body, constantly have ocular disturbances; and patients that have ocular pictures of the disease, have tumors. The lesions are lasting, do not decrease, seem to be progressive and chronic, but the visual acuteness increases considerably and rapidly when the tumors are dissected out. I presume that all the changes are due to the secretions of the parasites in the human organism of a toxic substance that produces changes in the eye and in vision.

Faithfully yours,

R. PACHECO LUNA.

Guatemala City, Central America.

### OPERATIONS FOR SQUINT.

To the Editor:

Dr. Loeb's paper on Convergent Squint in the September number of the JOURNAL states the case so unfairly to the advocates of real operative cure, and supports his own contention so poorly that I cannot resist the temptation to criticize.

His first argument is that operative work is not invariably successful. How many operations would be done in any surgical field if it were necessary to guarantee 100 per cent results? However, I contend that, *for practical purposes*, an invariable cure does result if the proper operative procedures are employed.

His second argument that a divergent squint develops in some cases is simply an admission that poor work was done in those cases and is another argument against tenotomies of the interni.

His statistics are extremely weak proof of his contention for only 11 out of his 27 were "straight." He fails to state whether this was simply a naked

eye appearance or by any of the balance tests. The chances are he means the former, in which event even these 11 are worthless for purposes of statistics. As regards his "near straight" cases there is nothing to be said for, as far as a *useful pair of eyes is concerned* a "miss is as good as a mile." If the advocates of correct operative work could not show far better statistics than his they would very carefully "keep on saying nothing." For, as a matter of fact, few of us who operate do so until we have eliminated the cases that are cured by glasses and visual training. Therefore we begin where he leaves off.

He seems to look at the subject solely from the standpoint of securing a cosmetic result, whereas in many cases, properly handled, it is possible to secure binocular vision of the second degree and occasionally even stereoscopic vision.

None of the so-called muscle cranks perform complete tenotomies of the interni and therefore, in their hands, the chance of having a later divergence is practically zero. Tenotomy seems to fill his mind as being the only available operative procedure.

I doubt very much if Dr. Valk ever intended to convey the idea that he would operate a case until trying, *for a reasonable time*, the usual nonoperative treatment.

When cases are seen in the third or fourth year and lenses assisted by visual training, alternating monocular and binocular with the amblyoscope, fail to give the desired result it is my desire, and practice when permitted, to begin operative work in the fifth year; and I have had no occasion to regret such practice. This is done in order to *increase the chances of securing a functioning pair of eyes* rather than simply a cosmetic result.

It is work such as Dr. Loeb advocates (postponement of cure till too late to train binocular vision) that is the basis of the text book statements to the effect that results are rarely more than cosmetic in the operative cure of convergent squint.

Very respectfully,

RODERIC O'CONNOR.

Oakland, Cal.

*To the Editor:*

It is not my desire to enter into a controversy with Dr. O'Connor, but his letter in this issue of the JOURNAL requires a reply. My article nowhere states that operation for squint is unnecessary. I, too, have operated on such cases and have had my share of good results. The purpose of my paper was to challenge the position that an operation should always be done, and it seems that Dr. O'Connor agrees with me, for he says "Few of us operate until we have eliminated the cases that are cured by glasses and visual training." I therefore have no quarrel with Dr. O'Connor, but with those "few."

Dr. O'Connor states that my cosmetic results were not very good, only 11 out of 27 cases being "straight," or about 40 per cent. There were, however, 6 other cases that were almost straight, so nearly so that only a careful examination showed any convergence. I may say that the patients and parents were quite satisfied with the results. If I seem to lay stress on the "cosmetic" results, it is because *that* is what the patient goes to the physician to have corrected. He is not interested in binocular vision and stereoscopic vision, for not having had them he does not miss them. If we attempt to give them these also, we may get "in many cases binocular vision of the second degree, and *occasionally* even stereoscopic vision." I submit that these terms are hardly statistical enough for argument, in fact I would ask the doctor to quote statistics giving in the exact terms, which he deprecates my not having used, the results of operative treatment in regard to the exact position of the eyes as well as the results so far as binocular vision and stereoscopic are concerned. I note that he does not claim that these latter are the result of the *operation*, but of the subsequent treatment. May I ask (Wilson), why that can not be carried out as well after correction with glasses as after correction with operation?

To again quote from Dr. Valk, "Finally I would like to ask the question, even though we are urged not to operate until all other methods fail, when should we operate on these cases? Or,

to put the question in another way, should we not operate on all cases of squint?" That seems to me to be plain English, and does indicate that Dr. Valk considers, if he does not actually advocate, the possibility of dispensing with the usual nonoperative treatment.

To quote from De Schweinitz, *Diseases of the Eye*, 1916, p. 547—"if they (lenses) are worn early enough, and in addition fusion training is carried on, the strabismus will be cured in 30 to 70 per cent of cases;" page 551, "if possible operation should not be undertaken until the fusion faculty has been developed by the exercises already described, and in no circumstances until the refractive error has been fully corrected and glasses worn for at least six months. If the exercises have failed to develop the power of binocular fusion \* \* \* \* it would seem wise to wait \* \* \* \* until after the period of rapid growth and development." As I understand this, it would mean until after the age of puberty at least.

Additional quotations would make this too long. In conclusion, I would like to sum up my paper in the following words, to which position I still adhere,—in view of the fact that many patients, or their parents, refuse operation but agree to the wearing of glasses, and in view of the fact that glasses will in a large number of cases (40 per cent of mine) correct the position of the eyes, and in view of the fact that by no means all operations are successful, some even resulting in strabismus of the opposite character, while the necessity for the wearing of glasses still remains, the position, whether stated outright or merely implied, that all cases of convergent strabismus should be operated is not a tenable one. Any other conclusions ascribed to me will be found unjustified on a careful reading of my paper.

Very truly yours,

CLARENCE LOEB.

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#### BIOGRAPHIC SKETCHES.

LORENZO BURROWS, JR., Major M. R. C.—The many friends of Lorenzo Burrows, Jr., M. D., of Buffalo, N. Y., will

learn with sincere sorrow of his death, which occurred with the Army in France on September seventeenth.

Dr. Burrows was among the first to enlist when the United States declared war and was commissioned as Captain in Hospital Unit No. 23. He was actively engaged at the front when he was stricken with pneumonia from which he died.

Dr. Burrows was born in 1867 in Albion, N. Y., and graduated from the

surgeons of the Buffalo General Hospital and later on the staff of the Erie County Hospital and the Erie County, Eye, Ear, Nose and Throat Hospital. As an ophthalmic surgeon, Dr. Burrows was exceedingly skillful. He was a careful diagnostician.

His was an unusually frank and lovable disposition. He leaves a widow and five children, four members of his immediate family being also in service in France.



Lorenzo Burrows, Jr. Major, M. R. C. 1867-1918

College of Physicians and Surgeons in New York in 1889. He served as an assistant to Dr. Fleming Carrow of Detroit in the University of Michigan, moving to Buffalo in 1890, where he practised ophthalmology with distinction until he entered the service in 1918. He was one of the ophthalmic

He will be held in affectionate remembrance by his colleagues and by a wide circle of devoted friends. A recent number of the Army and Navy Journal mentions his promotion from the rank of captain to that of major in the United States Army.

F. PARK LEWIS.



LUTHER HALSEY GULICK, educator, author and specialist in physical training, died at South Casco, Me., August 13, 1918. He was born at Honolulu, H. I., December 4, 1865, and was brother of Frances Gulick Jewett and Sidney Lewis Gulick, both well known authors. He is of special interest to ophthalmologists because of his book, "Medical Inspection in Schools," which was first published in 1907.

T. H. S.

NEIL JAMIESON HEPBURN.—A well known ophthalmologist and otolaryngologist of New York City. He was born in the Orkney Islands, Scotland, October 8, 1846, son of David Guthrie and Janet Shearer Hepburn. His medical degree was received at the College of Physicians and Surgeons in the city of New York in 1868. He was ophthalmologist to the Manhattan Eye, Ear, and Throat Hospital for many years, and, at the time of his death, consulting surgeon to both this institution and the Paterson, N. J., Eye and Ear Infirmary. He was a member of the American Ophthalmological and Otological Societies, and a Fellow of the American College of Surgeons.

All who knew Dr. Hepburn speak highly of him. At school he was a bright, quick scholar, always passing his mates. Because of his extreme youth alone, he had to wait a year to enter the Free Academy (now City College) and yet another for his diploma from the College of Physicians and

Surgeons. He was a man of impressive appearance, six feet tall, wiry, blond, wearing as a rule a mustache, and walking with a quiet and stately air. He was on the Sanitary Commission during the Civil War, and a captain of the Old Guard of New York in his later days. A member of the Dutch Reformed Church, he believed in the Bible from cover to cover. He married, May 5, 1869, Lucinda Pettit. He died at his home in New York City, May 28, 1918.

T. H. S.

SAMUEL COBB NORRIS, Captain, M. R. C., U. S. Army, of Anderson, Ind., died at his home, August 4, of peritonitis, the result of some affection of the liver. He had practiced as ophthalmologist and otolaryngologist at Anderson for eighteen years. Dr. Norris was born at Cincinnati in 1870, received the medical degree at the Miami Medical College, Cincinnati, in 1894, and later, the bachelor of arts at Cincinnati University. He was for many years associate professor of Hygiene and Sanitary Science in Indiana University, Bloomington and Indianapolis, for the last nine years of his life city chemist at Anderson, and for a very long time editor of the Central State Medical Magazine.

Dr. Norris is survived by his widow and two children, as well as by several other relatives. The remains were interred at Spring Grove Cemetery, Cincinnati, with military honors.

T. H. S.

## NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. As these columns go to press on the 30th of the month contributors should send in their items by the 25th. The following gentlemen have consented to supply the News Item Editor with the news from their respective sections: Dr. Edmund E. Blaauw, Buffalo; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered, as well as all foreign countries. Volunteers are therefore needed and it is hoped that they will respond promptly to this call.

### DEATHS.

Dr. Horace R. Burns died from pneumonia following influenza October 18 at his home in Denver, Colo.

Capt. Lorenzo Burrows, M.R.C., Buffalo,

New York. Aged fifty-one. Died in France, September 17th, from pneumonia.

Dr. Paul Guilford, of Chicago, died October 20th, from pneumonia following influenza.

Dr. Charles Devereux Marshall, of London,

died of cholera at Bombay, September 14, while on active service, aged 50 years.

Dr. J. M. Ray, died October 11th, in Louisville, Kentucky.

#### PERSONALS.

Dr. P. N. K. Schwenk, Ophthalmic Surgeon to Wills Hospital, Philadelphia, has been critically ill with pneumonia.

Dr. Edwin B. Miller, 2028 Chestnut Street, Philadelphia, has been appointed Assistant Surgeon to Dr. J. Milton Griscom, Wills Hospital.

Dr. George C. Yeager has been appointed Clinical Assistant on the Clinic of Dr. J. Milton Griscom, Wills Hospital, Philadelphia.

Col. Geo. E. de Schweinitz, of Philadelphia, delivered one of the patriotic addresses at the Bellevue Stratford Hotel in connection with the meeting of the Pennsylvania State Society held in Philadelphia on September twenty-fourth.

Dr. Ernest B. Mongel, of Philadelphia, has been appointed assistant surgeon. Dr. S. W. Newmayer and Dr. Jno. J. Wiley, clinical assistants to the out patient department of the Episcopal Hospital in the service of Dr. G. Oram Ring.

Doctor Samuel D. Risley, of Philadelphia, who has returned from a summer sojourn at Bear Lake, Luzerne County, Pennsylvania, gave a most scholarly presentation of "Uveal Disease and Its Sequellae" before the Eye, Ear, Nose and Throat section of the Medical Society of Pennsylvania at its annual meeting in Philadelphia, September twenty-fourth.

Dr. L. Webster Fox, of Philadelphia, returned recently from a vacation trip to the Pacific Coast, during which he visited his son, L. Webster Fox, Jr., who is First Lieutenant in the heavy Artillery and is located at Fort MacArthur, San Pedro, California. Dr. Fox had the rare pleasure of motoring from San Diego to Vancouver over the famous El Camino Road.

Dr. Wm. M. Sweet, of Philadelphia, who has served the American Ophthalmological Society for the past ten years as its secretary, has felt compelled to retire from that position because of pressure of other duties. An appropriate expression of the Society's profound appreciation of his services was unanimously voiced in an appropriate resolution. Dr. Sweet has been succeeded by Dr. Thos. B. Holloway, of Philadelphia.

Lieutenant Alexander Duane, of New York, visited the Ophthalmic Section of the College of Physicians of Philadelphia on Thursday evening, October eighteenth, and read a most scholarly paper upon "The Basic Principles of Diagnosis in Motor Anomalies of the Eye."

Previous to the meeting, Lieutenant Duane was entertained at dinner by Dr. S. Lewis Ziegler, Acting President of the Section, at his country home at Haverford.

#### MILITARY NOTES.

Captain Harry Vanderbilt Würdemann, M. R. C., has been ordered to Camp Lewis.

Dr. E. S. Keitz, of New Orleans, has received a Lieutenant's commission in the Medical Corps and is stationed at Camp Beauregard, Louisiana.

Dr. L. M. Gurley, of Johnstown, Pennsylvania, has accepted a commission as Captain in the Medical Corps and has been assigned to Camp Sheridan, Alabama.

Dr. Samuel M. D. Marshall of Milford, Del., has been commissioned Captain in the Ophthalmic Department of the United States Army, and assigned to Camp Dix.

Lieutenants Shea and Stanford, of Memphis, with Base Hospital No. 57, have safely arrived overseas and are on active service with this Hospital Unit.

Dr. W. Likely Simpson, of Memphis, recently received a commission as Captain and has reported to Camp Greenleaf, Fort Oglethorpe, Georgia, for Military training.

Dr. L. Waller Deichler, Chief of the Eye Clinic at the Presbyterian Hospital, Philadelphia, has been appointed Ophthalmologist to Local Draft Board, No. 20.

Lieutenant-Colonel E. C. Ellett of Memphis, who recently sailed in command of a Head Unit of twenty-six surgeons has safely arrived overseas, and is on active duty.

Dr. Frank Barber, of Rochester, New York, has been commissioned First Lieutenant in the Medical Corps and is ordered to report at Camp Holabird, Baltimore, October twentieth.

Captain Chas. D. Blassingame, of Memphis, is now Ophthalmologist to Evacuation Hospital No. 49, and has recently left Camp Greenleaf with this Unit for overseas duty.

Lieutenant George L. Stephan, of Philadelphia, has been commissioned Captain in Field Hospital Company 110, 103rd Sanitary Train, American Expeditionary Forces, "Somewhere in France."

Dr. J. L. Blue, of Memphis, who has recently received a Lieutenant's commission, has reported to Camp Taylor, Louisville, Kentucky, and is very much pleased with his training there.

Dr. N. M. McFarland, of Memphis, has just completed the internship at Brooklyn Eye and Ear Infirmary and has reported to Camp Greenleaf for military training. Dr. McFarland has received a commission as First Lieutenant.

Dr. Vard H. Hulen, of San Francisco, has been stationed at Base Hospital, Camp Dodge, Iowa, in the Department of Ophthalmology, since June twenty-sixth. He has recently been ordered to overseas service with the rank of Major.

At the request of the Federal Reserve Bank of Chicago, Government Bond Department, the following notice is published: "All United States Treasury Certificates of Indebtedness of Series IV. D., dated August 6, 1918, and maturing December 5, 1918, are hereby called for redemption on November 21, 1918, at par and accrued interest pursuant to the provision for such redemption contained in the certificates. On November 21, 1918, interest on all Certificates of said series will cease to accrue."



# OPHTHALMIC LITERATURE

(For explanation see p. 747)

## DIAGNOSIS.

- Alger, E. M.** Malingering from Standpoint of Eye. (Dis.) *Med. Rec.*, v. 94, p. 596.
- Fellows, C. G.** Malingering of Eye. *Amer. Inst. Homeop.*, v. 11, p. 424.
- Klauber.** Simulation and Aggravation of Central Scotoma, *Wien. kl. Woch.*, 1917, p. 1170. *Abst. Klin. M. f. Augenh.*, v. 60, p. 405.
- Roelofs, C. O.** The Minimum Separabile and the Smallest Findings. *Abst. Klin. M. f. Augenh.*, v. 60, p. 655.
- Schwarz.** Exophthalmometer. *Münch. med. Woch.*, 1917, p. 1414. *Abst. Klin. M. f. Augenh.*, v. 60, p. 404.
- Snellen.** Visual Acuity as Gage for Retinal Function. *Nederl. Tijdschr.*, v. Geneesk, July 20, 1918, p. 240.
- Stargardt.** Simple and Movable Adaptometer. *Zeit. f. Augenh.*, v. 39, pt. 3. *Abst. Klin. M. f. Augenh.*, v. 60, p. 830.
- Wolffberg.** Theory and Practice of Tests for Acuteness of Vision. *Woch. f. Therapie und Hyg. d. Auges*, Oct., 1917, Nos. 1 and 2.

## THERAPEUTICS.

- Chotzen and Kuznitsky.** Effect of Ultraviolet Light on Cornea. *Klin. M. f. Augenh.*, v. 60, p. 827.
- Garcia Mansilla, S.** Formulas for Ophthalmic Medicaments. *Arch. de Oft., Hisp.-Amer.*, v. 18, p. 457.
- Hancock, J. C.** Iodin in Ophthalmology. *Long Island Med. Jour.*, v. 12, p. 339.
- Hermann, R.** Collargol in Ophthalmology. *Rostock Diss.*
- König.** Value of Subconjunctival Dionin Injections. *Münch. med. Woch.*, 1917, No. 52.
- Plügg.** Milk Injections in Eye Diseases. *Woch. f. Therap. u. Hyg. d. Auges*, 1917, No. 41. *Abst. Klin. M. f. Augenh.*, v. 60, p. 670.
- Salzer.** Roentgen Rays in Ophthalmology. *Abst. Klin. M. f. Augenh.*, v. 60, p. 831.
- Schanz, F.** Light Bath. *Abst. Klin. M. f. Augenh.*, v. 60, p. 430.
- Uddgren, G.** Milk Injections in Ophthalmology. *Abst. Klin. M. f. Augenh.*, v. 60, p. 401.

## OPERATIONS.

- Bamberger.** Substitute for Tear Drain. *Deut. med. Woch.*, 1917, p. 1423. *Abst. Klin. M. f. Augenh.*, v. 60, p. 404.
- Duverger.** Local Anesthesia for Eye and Orbit. *Presse Méd.*, v. 26, p. 408.
- Macphail, J. N.** Importance of Some Minor Operations. *Indian Med. Gaz.*, v. 53, p. 205.

## REFRACTION.

- Green, J., Jr., and Hardy, W. F.** Astigmatism Against the Rule, Its Recognition and

- Frequency. *Sec. on Ophth.*, A. M. A., 1918, p. 131.
- Grüter.** Optical Help in Great Prostration Following Wounds. *Deut. med. Woch.*, 1917, p. 1127. *Abst. Klin. M. f. Augenh.*, v. 60, p. 406.
- Henker, O.** Different Kinds of Spectacles. *Zeit. f. ophth. Optik*, 1918, p. 11. *Abst. Klin. M. f. Augenh.*, v. 60, p. 661.
- Hirota, K.** Myopic Glasses, Sei-i-Kwai, M. J., v. 37, No. 4.
- Jackson, E.** Common Changes in Astigmatism and Their Causes. *Sec. on Ophth.*, A. M. A., 1918, p. 88.
- Kahn, W. W.** Pollakiuria and Functional Disturbances due to Eyestrain. *Sec. on Ophth.*, A. M. A., 1918, p. 120.
- Klughardt.** Divers' Spectacles. *Abst. Klin. M. f. Augenh.*, v. 60, p. 280.
- Krämer, R.** High Hypermetropia in Eyes Retaining Lens. *Wien. klin. Woch.*, 1917, p. 1405. *Abst. Klin. M. f. Augenh.*, v. 60, p. 279.
- Landolt, E.** Refraction of the Crystalline Lens. *Arch. de Oft., Hisp.-Amer.*, v. 18, p. 438.
- Landwehr, J. H.** Recognition of Anisometropia. *Abst. Klin. M. f. Augenh.*, v. 60, p. 660.
- Rohr, M.** Development of the Telescope. *Zeit. f. ophth. Optik*, 1918, p. 25. *Abst. Klin. M. f. Augenh.*, v. 60, p. 828.
- Wessely.** Effect of Contact Glasses in Keratoconus. *Münch. med. Woch.*, 1917, p. 1621. *Abst. Klin. M. f. Augenh.*, v. 60, p. 281.
- White, J. W.** Spasm of Accommodation. (Bibl.) *Arch. of Ophth.*, v. 47, p. 466.
- Wilmer, W. H.** Some Ocular Conditions Affecting Efficiency of the Aviator. (6 ill.) *Arch. of Ophth.*, v. 47, p. 440.

## OCULAR MOVEMENTS.

- Bard, L.** Voltaic Nystagmus. *Ann. de Méd.*, v. 5, p. 239. *Abst. Jour.*, A. M. A., v. 71, p. 1348.
- Mechanism of Congenital Deviation of Eyes and Rotation of Head in Hemiplegia.** *Abst. Jour.*, A. M. A., v. 71, p. 1096.
- Britto, V.** Present Status of Nuclear Ophthalmoplegia. *Rev. d. Cursos*, v. 4, p. 3.
- Buren, T.** Convergent Strabismus Observed in Giessen Univ. Clinic from 1904 to 1914. *Giessen Diss.*
- Franken.** Bilateral Rotary Nystagmus in Basedow's Disease. *Abst. Klin. M. f. Augenh.*, v. 60, p. 701.
- Heydt, von der R.** Eye Muscle Imbalance. *Ill. Med. Jour.*, v. 33, p. 329.
- Hoeve, J. van der, and Kleijn, A.** Tonic Labyrinth Reflexes in Eye. *Abst. Klin. M. f. Augenh.*, v. 60, p. 403.



- Hoffmann.** Oculomotor Paralysis. Münch. med. Woch., 1917, p. 1371. Abst. Klin. M. f. Augenh., v. 60, p. 132.
- Hume, J.** The Cross-eyed Child Neglected. New Orleans Med. and Surg. Jour., v. 71, p. 206.
- Marquez.** Strabismus Cured Through Functional Treatment. Arch. de Opht., Hisp.-Amer., v. 18, p. 454.
- Pickler.** Kinematography of Binocular Movements. Abst. Klin. M. f. Augenh., v. 60, p. 275.
- Ribas Valero.** Binocular Vision in Strabismus and Normal Binocular Vision. Arch. de Oft., Hisp.-Amer., v. 18, p. 361.
- Scruton, W. A.** Examination of Applicants for Aviation Service. (Nystagmus.) Ann. Otol. Rhin. and Laryngol., v. 27, p. 528.
- Wells, D. W.** Best Way to Straighten Cross Eyes. Amer. Jour. Ophth., v. 1, p. 727.
- Wheeler, J. M.** Paralysis of Sixth Cranial Nerve Associated with Otitis Media. Sec. on Ophth., A. M. A., 1918, p. 51.

## CONJUNCTIVA.

- Abecassis, A.** Saturated Solution of Sulphate of Soda in External Eye Disease. Rev. Gén. de Clin et de Thérap., v. 32, p. 153.
- Ask, F.** Amyloid Degeneration in Conjunctiva and Tarsus. Hosp.-Tid., v. 61, p. 284.
- Aubineau, E.** Subconjunctival Injections and Ocular Cardiac Reflex. Ann. d'Ocul., v. 155, p. 405.
- Bachstez.** Treatment of Gonoblennorrhea of Eye with Milk Injections. Wien. Klin. Woch., 1917, p. 1168. Abst. klin. M. f. Augenh., v. 60, p. 670.
- Bentzen, C. F.** Amyloid Degeneration of Conjunctiva. Hosp.-Tid., v. 61, p. 212.
- Bonnefon, G.** Operative Technic for Pterygium, Autoplasty by Inversion. Ann. d'Ocul., v. 155, p. 419.
- Cary, E. H.** Histology and Pathology of Lid in Trachoma Treatment. Sec. on Ophth., A. M. A., 1918, p. 177.
- Chiari.** Changes in the Conjunctiva from Typhus. Abst. Klin. M. f. Augenh., v. 60, p. 417.
- Criger, L. W.** Vernal Catarrh of Bulbar Type. (Dis.) Arch. of Ophth., v. 47, p. 511.
- Delmiro de Caralt.** Ocular Pemphigus. Arch. de Oft., Hisp.-Amer., v. 18, p. 413.
- Highet, H. C.** Treatment of Trachoma with Carbonic Snow. Med. Jour., Siamese Red Cross, v. 1, p. 16.
- Hirschberg, J.** Trachoma in the U. S. A. Cent. f. p. Augenh., Sept., Oct., Nov., Dec., 1917. Abst. Klin. M. f. Augenh., v. 60, p. 677.
- Hirschberg, J., and Henning, R.** Trachoma in Denmark. Abst. Klin. M. f. Augenh., v. 60, p. 676.
- Hiwatari.** Plasmoma of Conjunctiva (Pascheff.) (2 ill.) Amer. Jour. Ophth., v. 1, p. 719.
- Horniker.** Experiences with Trachoma in Army. Wien. med. Woch., 1918, Nos. 1 and 2. Abst. Klin. M. f. Augenh., v. 60, p. 833.
- Knapp, A., and Dwyer, G.** Acute Streptothrix Infection of Conjunctiva. Arch. of Ophth., v. 47, p. 496.
- König.** Vernal Conjunctivitis in Syria. Münch. med. Woch., 1917, p. 1558. Abst. Klin. M. f. Augenh., v. 60, p. 282.
- Likiernik.** Etiology and Prevention of Trachomatous Pannus. Woch. f. Therap. u. Hyg. d. Auges, 1917, Oct. No. 3.
- May, C. H.** Chronic Streptothrix Infection of Conjunctiva. (Dis.) Arch. of Ophth., v. 47, p. 509.
- Morax, V.** Traumatic Ocular Infection Caused by a Special Coccus. (1 ill.) Ann. d'Ocul., v. 155, p. 413.
- Ochsenius, L.** Treatment of Blennorrhea. Jahrb. f. Kinderheil., v. 37, p. 152.
- Paganelli, T. R.** Pneumococcal Infection of Eye. Jour. Med. Soc., New Jersey, v. 15, p. 341.
- Pichler.** Ophthalmia in Military Service. Wien. med. Woch., 1918, Nos. 1 and 2. Abst. Klin. M. f. Augenh., v. 60, p. 676.
- Rechsteiner.** Sophol in Treatment of Ophthalmogonoblennorrhea. Inaug. Diss., 1916.
- Roedelius.** Argyrosis of Conjunctiva. Abst. Klin. M. f. Augenh., v. 60, p. 282.
- Rosenstein, A. M.** Cure of Trachoma Complications with Parenteral Milk Injections. Münch. med. Woch., Jan., 1918. Abst. Klin. M. f. Augenh., v. 60, p. 669.
- Salus, R.** Argyrosis of Conjunctiva and Cornea. Wien. kl. Woch., 1917, p. 1472. Abst. Klin. M. f. Augenh., v. 60, p. 281.
- Turner, H. H.** Etiology of Phlyctenular Ophthalmia. Sec. on Ophth. A. M. A., 1918, p. 188.
- Verhoeff, F. H.** Further Observations on Parinaud's Conjunctivitis. (1 ill. 1 col. pl.) Amer. Jour. Ophth., v. 1, p. 705.
- Waldmann, B.** War Wounds and Ophthalmoblennorrhea. Zeit. f. Augenh., v. 38, p. 423.
- Wolff.** Degeneration Form of Gonococcus; Its Meaning in Practice. Abst. Klin. M. f. Augenh., v. 60, p. 688.

## CORNEA AND SCLERA.

- Conlon, F. A.** Blue Sclerotics and Associated Otosclerosis. Amer. Jour. Ophth., v. 1, p. 726.
- Paul.** Mixed Infection on Dog's Cornea in Experimental Small-pox. Abst. Klin. M. f. Augenh., v. 60, p. 410, 666.
- Rothschild.** Association of Blue Sclera with Brittle Bones. Inaug. Diss., 1917. Abst. Klin. M. f. Augenh., v. 60, p. 120.
- Sachs, O.** Congenital Syphilis and Parenchymatous Keratitis. Wien. klin. Woch., 1917, p. 1153. Abst. Klin. M. f. Augenh., v. 60, p. 287.
- Sulzer and Chappé.** Radiotherapy and Opacity of Cornea. Ann. d'Ocul., v. 155, p. 427.
- Weeks, J. E.** Disciform Keratitis. Sec. on Ophth. A. M. A., 1918, p. 30.

- Wessely.** Ophthalmia Nodosa. Münch. med. Woch., 1917, p. 1621. Abst. Klin. M. f. Augenh., v. 60, p. 419.
- Wohde-Twistringer, B.** Optochin in Serpent Ulcer of Cornea. Rostock Diss.

#### ANTERIOR CHAMBER AND PUPIL.

- Dunn, J.** True Argyll-Robertson Pupil. Arch. of Ophth., v. 47, p. 469.
- Leahy.** Pupillary Reaction in Chronic Alcoholism. New York Med. Jour., Apr. 20, 1918.
- Pichler.** Hematoid Crystals in Anterior Chamber. Abst. Klin. M. f. Augenh., v. 60, p. 841.
- Pflügk.** Pupillary Movements. Abst. Klin. M. f. Augenh., v. 60, p. 658.
- Raeder, G.** Instrument for Measuring Depth of Anterior Chamber. (3 ill.) Norsk Mag. for Laegeviden., v. 79, p. 862.
- Reitsch, and Röper.** Unilateral Mydriasis in Wounds of Spinal Cord. Abst. Klin. M. f. Augenh., v. 60, p. 710.
- Uribe-Troncoso, M.** Unilateral Argyll-Robertson Pupil. Arch. of Ophth., v. 47, p. 509.
- Westphal.** Temporary Loss of Pupillary Light Reflex During Diabetes Mellitus. Abst. Klin. M. f. Augenh., v. 60, p. 130.

#### UVEAL TRACT.

- Fuchs, E.** Ophthalmia Interna. Wien. med. Woch., 1917, No. 46. Abst. Klin. M. f. Augenh., v. 60, p. 692.
- Marin Amat, M.** Traumatic Iridochoroiditis and Syphilis. Arch. de Oft. Hisp.-Amer., v. 18, p. 398.
- Shewell, H. W., and Marshall, C. D.** Unusual Case of Syphilitic Iritis. Jour. Roy. Army Med. Corps, v. 30, p. 214.

#### SYMPATHETIC DISEASE.

- Ribstein, W.** Sympathetic Ophthalmia After Subconjunctival Scleral Rupture. Strassburg Diss.
- Schevensteen.** Sympathetic Ophthalmia. Ann. d'Ocul., v. 155, p. 392.
- Wessely.** Sympathetic Ophthalmia. Münch. med. Woch., 1917, p. 1621. Abst. Klin. M. f. Augenh., v. 60, p. 421.
- Repeated Titles.** Morax, (v. 1, p. 220) Arch. of Ophth., v. 47, p. 534.

#### GLAUCOMA.

- Bühler, A.** Circulation of Blood in Eye. Arch. f. Physiol., v. 165, pt. 1-3.
- Byers, W. G. M.** Histologic Findings in Eyeballs Lost After Sclero-Corneal Trephining. (2 ill.) Arch. of Ophth., v. 47, p. 462.
- Harry, P. A.** Camphor in Partial Optic Atrophy of Glaucoma. Prescriber, 1918, p. 89.
- Köllner.** Oscillation of Pressure in Glaucoma. Münch. med. Woch., 1918, p. 229. Abst. Klin. M. f. Augenh., v. 60, p. 681.
- Meller.** Late Infection Four Years After Elliot's Trephining. Abst. Klin. M. f. Augenh., v. 60, p. 429.

#### CRYSTALLINE LENS.

- Allport, F.** Operation in Senile Cataract. Ill. Med. Jour., v. 34, p. 185.
- Chudzinski, G.** One Thousand Cataract Extractions. Breslau Diss.
- Fisher, W. A., and Thornburg, H. D.** Method of Acquiring Cataract Technic Leading to Smith-Indian Operation. Sec. on Ophth. A. M. A., 1918, p. 231.
- Hess.** Development of Senile Cataract. Arch. f. Augenh., v. 83, p. 41. Abst. Klin. M. f. Augenh., v. 60, p. 682.
- Husain, T.** Operation for Cataract. Indian Med. Rec., v. 38, p. 24.
- Jano.** Posterior Lenticonus. Zeit. f. Augenh., 1917, p. 192.
- Junés.** Modification of Cataract Operation. Ann. d'Ocul., v. 155, p. 433.
- Kruger.** Unilateral Reflex Cataract. Abst. Klin. M. f. Augenh., v. 60, p. 835.
- Mayer.** Non-luetic Partial Reflex Cataract. Neurol. Zent., v. 37, 1918. Abst. Klin. M. f. Augenh., v. 60, p. 835.
- Meller.** Discission for Lamellar Cataract. Abst. Klin. M. f. Augenh., v. 60, p. 428.
- Perez Buñil.** Reclination of Cataract. Arch. de Oft. Hisp.-Amer., v. 18, p. 446.
- Prince, A. E.** Operation for Cataract Especially Adapted to Cases of Sepsis of Conjunctival or Lacrimal Sac. Sec. on Ophth. A. M. A., 1918, p. 220.
- Santos Fernandez, J.** Late Operations in Congenital Cataract. Arch. de Oft. Hisp.-Amer., v. 18, p. 442.
- Schurman.** Shagreen Lens. Zeit. f. Augenh., v. 38, p. 683. Abst. Klin. M. f. Augenh., v. 60, p. 683.

#### VITREOUS.

- Harrison, W. G.** Traumatic Intraocular Hemorrhage, Prognosis and Treatment. Southwest Med. Jour., v. 11, p. 696.

#### RETINA.

- Abelsdorff.** Observation of Blood Movements in Eyes. Abst. Klin. M. f. Augenh., v. 60, p. 279.
- Bardsley, P. C.** Retinal Signs of Arteriosclerosis due to Blood Pressure. Clin. Jour., v. 47, p. 136.
- Bergmann.** Lesions of Eye in War Nephritis. Deut. med. Woch., 1918, p. 520. Abst. Klin. M. f. Augenh., v. 60, p. 842.
- Best, F.** Dark Adaptation of Eyes for Color and Night Blindness. (7 ill.) Zeit. f. Biologie, v. 68, p. 141.
- Boehmig.** Procedure for Increasing Functional Capacity of Eyes in Dark. Abst. Klin. M. f. Augenh., v. 60, p. 409.
- Breithaupt, A.** Recognition of Preretinal Hemorrhage. Heidelberg Thesis.
- Clark, H. S.** Familial Macular Degeneration with and without Dementia. Sec. on Ophth. A. M. A., 1918, p. 104.
- Fricke.** Etiology of Unilateral Retinitis Pigmentosa. Abst. Klin. M. f. Augenh., v. 60, p. 126.
- Hornicker, E.** War Nephritis. Wien. med. Woch., 1917, No. 25. Abst. Klin. M. f. Augenh., v. 60, p. 423.



- Klein, H. Intraocular Perception of Retinal Pigment Epithelium in Migrain. *Abst. Klin. M. f. Augenh.*, v. 60, p. 118.
- Knapp, A. Embolism of Central Retinal Artery in Chorea. *Arch. of Ophth.*, v. 47, p. 458.
- Luminère, L. Appearances Related to Persistent Impressions on Retina. *Compt. Rend. Acad. de Sc.*, v. 166, p. 654.
- Mayou, M. S. Thrombosis of Central Vein with Glaucoma, New Vessels on Surface of Iris. *Brit. Jour. Ophth.*, v. 2, p. 521.
- Meyer, H. Three Hundred Cases of Hemeralopia. *Abst. Klin. M. f. Augenh.*, v. 60, p. 712.
- Moreau, F. Macular Trouble in Traumatic Lesions of Occipital Region. (19 ill.) *Ann. d'Ocul.*, v. 155, p. 358.
- Polack, Purkinje's Phenomenon and Congenital Hemeralopia. *Compt. Rend. Acad. d. Sc.*, v. 166, p. 501.
- Schieck, Night Blindness and Unfitness for Service. *Abst. Klin. M. f. Augenh.*, v. 60, p. 843.
- Smith, P. Measuring Retinal Blood Pressure. *Brit. Jour. Ophth.*, v. 2, p. 487.
- Stargardt, Familial Pigmentation in Macula. *Abst. Klin. M. f. Augenh.*, v. 60, p. 412.
- Steinbugler, W. F. C. Retinitis Circinata. *Arch. of Ophth.*, v. 47, p. 513.
- Strübing, H. Small Doses of Sodium Santonate for Yellow and Violet Vision. Greifswald Diss.
- Westphal, A. Amaurotic Family Idiocy. *Münch. med. Woch.*, Jan., 1918, p. 81. *Abst. Klin. M. f. Augenh.*, v. 60, p. 130.
- Repeated Titles. Bailliart (v. 1, p. 158) *Arch. of Ophth.*, v. 47, p. 538. Danis (v. 1, p. 465) *Jour. A. M. A.*, v. 71, p. 1349.

#### TOXIC AMBLYOPIAS.

- Hamburger, C. Methyl Alcohol Blindness. *Münch. med. Woch.*, Jan. 29th, 1918, p. 141. *Abst. Klin. M. f. Augenh.*, v. 60, p. 703.
- Hensen, Optochin Disease of Eyes. *Münch. med. Woch.*, 1918, p. 268. *Abst. Klin. M. f. Augenh.*, v. 60, p. 702.
- Oysen, Optochin Amblyopia. Bonn Diss., 1917. *Abst. Klin. M. f. Augenh.*, v. 60, p. 702.

#### OPTIC NERVE.

- Adams, P. H. Retrobulbar Neuritis with Special Reference to Prognosis. *Brit. Jour. Ophth.*, v. 2, p. 522.
- Calhoun, F. P. Alterations in Visual Fields in Pellagra. *Sec. on Ophth. A. M. A.*, 1918, p. 157.
- Edwards, W. D. Acute Retrobulbar Neuritis of Obscure Origin Associated with Tooth Infection. (Dis.) *Arch. of Ophth.*, v. 47, p. 573.
- Henser, and Haren. Occult Accessory Sinus Disease and Optic Neuritis. *Münch. med. Woch.*, 1918, p. 239. *Abst. Klin. M. f. Augenh.*, v. 60, p. 696.

#### VISUAL TRACTS AND CENTERS.

- Bussy. Transitory Amaurosis Caused by Concussion. *Ann. d'Ocul.*, v. 155, p. 423.
- Caralt. Tumor of Hypophysis. *Arch. de Oft. Hisp.-Amer.*, v. 18, p. 450.
- Engler. Congenital Word Blindness. *Med. Klin.*, Nov., 1917, p. 1220. *Abst. Klin. M. f. Augenh.*, v. 60, p. 283.
- Henschen, S. E. Center for Vision. *Abst. Klin. M. f. Augenh.*, v. 60, p. 653.
- Holmes, G. Disturbances of Visual Orientation. (5 ill. Bibl.) *Brit. Jour. Ophth.*, v. 2, pp. 449, 506.
- Jobson, G. B. Hemianopsia. *Penn. Med. Jour.*, v. 22, p. 7.
- Pagenstecher, A. H. Recognition of Entoptic Scotoma. *Abst. Klin. M. f. Augenh.*, v. 60, p. 686.
- Pötzl, O. Inhibitory Phenomena Resulting from Lesions of Occipital Lobe. *Wien. med. Woch.*, 1916, No. 36.
- v. Szily, A., and Kupferle, L. Ray Treatment of Hypophysis Tumor. *Abst. Klin. M. f. Augenh.*, v. 60, p. 487.

#### COLOR VISION.

- Collins, G. L. Color Blindness, Its Relation to Ocular Conditions and Bearing on Public Health, etc. Washington, Gov. Printing Off., 1918.

#### EYEBALL.

- Eleonskaja. Growth of Eye Membrane. *Wiestnik Ophth.*, v. 27, March, 1915. *Abst. Klin. M. f. Augenh.*, v. 60, p. 664.
- Pardo, R. Posterior Enucleo-exenteration of Ocular Globe. *Gazz. d. Osp.*, v. 39, p. 125.

#### THE LACRIMAL APPARATUS.

- Fischer. Management of Tear Duct from a Rhinologic Standpoint. *Abst. Klin. M. f. Augenh.*, v. 60, p. 714.
- Hacker, V. Development of Nasal Tear Duct With Persistent Probing After Injury. *Münch. med. Woch.*, 1918, p. 490. *Abst. Klin. M. f. Augenh.*, v. 60, p. 844.
- Halle. Intranasal Tear Sac Operation in Baby for Removal of Catheter. *Med. Klin.*, March, 1918, p. 322. *Abst. Klin. M. f. Augenh.*, v. 60, p. 715.
- Kearney, J. A. Epiphora and Its Management. *Med. Rec.*, v. 94, p. 587.
- Kelsey, T. W. Obstruction of Lacrimonasal Duct. *Northwest Med.*, v. 17, p. 298.
- Polyak, L. Shot Wound of Tear Duct and Accessory Sinuses Healed by Intranasal Dacryocystotomy. *Abst. Klin. M. f. Augenh.*, v. 60, p. 697.
- Ruttin. Reflex Epiphora in Caloric Reaction. *Münch. med. Woch.*, 1918, p. 306. *Abst. Klin. M. f. Augenh.*, v. 60, p. 658.
- Thompson, W. R. Rational Etiology and Satisfactory Treatment of Dacryocystitis. *Sec. on Ophth. A. M. A.*, 1918, p. 78.
- Urraca, C. Treatment of Chronic Suppurative Dacryocystitis. *Arch. de Oft. Hisp.-Amer.*, v. 18, p. 459.



**Wessely.** Tear Duct Extirpation. Münch. med. Woch., 1917, p. 1621. Abst. Klin. M. f. Augenh., v. 60, p. 427.

## LIDS.

**Bachstez.** Functional Blepharospasm. Wien. klin. Woch., 1917, No. 50, p. 1579. Abst. Klin. M. f. Augenh., v. 60, p. 672.

**Black, M.** Management of Certain Intractable Lid Conditions. Sec. on Ophth. A. M. A., 1918, p. 212.

**Carraras, B.** Congenital Bilateral Ptosis. Motais' Operation. Arch. de Oft. Hisp.-Amer., v. 18, p. 451.

**Fuchs, E.** Elephantiasis of Lids. Heidelberg Diss. Pathologic Associated Movements of Lids. Abst. Klin. M. f. Augenh., v. 60, p. 687.

**Morrison, F. A.** Canthoplasty. Amer. Jour. Ophth., v. 1, p. 727.

**Weidler, W. B.** Solid Edema of Lids. (4 ill.) Amer. Jour. Ophth., v. 1, p. 722.

## ORBIT.

**Barbezat-Bayards.** Recognition of Carcinoma Cylindroma in Orbit. Inaug. Diss., 1917. Abst. Klin. M. f. Augenh., v. 60, p. 419.

**Boot, G. W.** Spontaneous Pulsating Exophthalmos. Ill. Med. Jour., v. 34, p. 217.

**Candat.** Phlegmon in Orbit. Abst. Jour. A. M. A., v. 71, p. 1349.

**Gibson, J. L.** Pulsating Exophthalmos Due to Rupture of Carotid in Cavernous Sinus. Med. Jour. Australia, Sept., 1918, p. 203.

**Gonzalez, J. de J.** Transient Relapsing Enophthalmos of Sympathetic Origin. Amer. Jour. Ophth., v. 1, p. 713.

**Gram, H. C.** Exophthalmic Goiter in Children. Hospitalstidende, 1918, p. 913.

**Hernaman-Johnson, F.** Roentgen Rays and Electricity in Exophthalmic Goiter. Arch. of Radiol. and Electrotherap., v. 23, p. 91.

**Sachse.** Repairing Disfigured Orbits. Münch. med. Woch., 1916, p. 1815. Abst. Klin. M. f. Augenh., v. 60, p. 428.

**Smith, D.** Cavernous Sinus Thrombosis. (Bibl.) Arch. of Ophth., v. 47, p. 482.

**Wilson, L. B.** Experimental Lesions in Cervical Sympathetic Ganglia in Relation to Exophthalmic Goiter. Amer. Jour. Med. Sc., v. 156, p. 553.

## TUMORS.

**Castelain, F.** Semiology of Sarcoma of Ciliary Region. Ann. d'Ocul., v. 155, p. 385.

**Duncan, R.** Glioma of Retina, Treated with Radium. (4 ill.) Amer. Jour. Ophth., v. 1, p. 715.

**Herrenschwand, F.** Subconjunctival Angioma. Abst. Klin. M. f. Augenh., v. 60, p. 840.

**Kleinertz.** Epibulbar Chromatophoroma. Inaug. Diss., 1917. Abst. Klin. M. f. Augenh., v. 60, p. 704.

**Rietz, E.** Glioma of Optic Nerve. Hygeia, 1918, p. 344. Abst. Klin. M. f. Augenh., v. 60, p. 840.

**Rouquier.** Oculomotor Reflexes with Orbital Tumor. Bull. de la Soc. Méd. des Hopit., v. 42, p. 467.

**Schmitt, L.** Multicentered Hemangioma. Würzburg Diss.

**Wessely.** Tumors of Orbit. Münch. med. Woch., 1917, p. 1621. Abst. Klin. M. f. Augenh., v. 60, p. 285.

**Whitaker, E.** Innocent Intraorbital Growth. New Zealand M. J., 1918, p. 61.

## INJURIES.

**Blatt.** Orbital Penetration by Stick Wound. Wien. klin. Monatsb., 1918, p. 61. Abst. Klin. M. f. Augenh., v. 60, p. 711.

**Cords, R.** Cause of Death from Orbital Wounds. Heidelberg Ophth. Cong., 1916. Abst. Zeit. f. Augenh., v. 36, p. 106.

**Emanuel.** Treatment of Ocular Wounds at the Front. Münch. med. Woch., 1917, p. 1603.

**Erkes.** Therapy of Retrobulbar Shot Wounds of Orbit. Münch. med. Woch., 1917, p. 1473. Abst. Klin. M. f. Augenh., v. 60, p. 428.

**Franceschetti-Spitzer, B.** Late Results in Wound of Lens. Inaug. Diss., 1918. Abst. Klin. M. f. Augenh., v. 60, p. 840.

**Gibson, J. L.** Two Cases of Siderosis. Med. Jour. Australia, Sept., 1918, p. 201.

**Halle, M.** Foreign Bodies in Tear Duct. Münch. med. Woch., Nov. 20, 1917. Abst. Klin. M. f. Augenh., v. 60, p. 287.

**Halliday, J. C.** Injury to Eye by Bursting of Liquid Core Golf Ball. Med. Jour. Australia, v. 1, p. 302.

**Hessberg, R.** War Wounds in Neighborhood of Eyes. Med. Klin., 1918, p. 86. Abst. Klin. M. f. Augenh., v. 60, p. 710.

**Hoffmann.** Pathologic Anatomy of Eye After Perforating Wound of Conjunctiva. Heidelberg Diss.

**Hurwitz, J.** Eye Wounds in Heidelberg Clinic in 1913. Heidelberg Diss.

**Köhler.** Differentiation of Intra- from Extra-bulbar Fragments by X-ray. Münch. med. Woch., 1918, p. 399. Abst. Klin. M. f. Augenh., v. 60, p. 842.

**Kolbe.** Bilateral Blinding in War. Abst. Klin. M. f. Augenh., v. 60, p. 462.

**Löwenstein, A.** Eye Wounds in Mountain Warfare. Abst. Zeit. f. Augenh., v. 36, p. 107.

**Mayer, O.** West Operation for Shot Wound of Nasal Tear Duct. Münch. med. Woch., 1917, p. 816. Abst. Klin. M. f. Augenh., v. 60, p. 286.

**Pichler.** Nonperforating Splinter Wounds of Anterior Optic Segment. Abst. Klin. M. f. Augenh., v. 60, p. 710. Recognition of Electric Cataract. Abst. Klin. M. f. Augenh., v. 60, p. 683.

**Purtscher.** Localization of Copper in Lens. Centralbl. f. p. Augenh., 1918, p. 33. Abst. Klin. M. f. Augenh., v. 60, p. 841.

**Saint-Martin.** Injury to Both Orbits from Bullet Wound. (2 ill.) Ann. d'Ocul., v. 155, p. 427.

**Stumpf-Pleikart.** X-ray Localization of Foreign Bodies. Feldärztl. Beil., No. 45, 1916.

Warthin, A. S., Weller, C. V., and Hermann, M. S. Ocular Lesions Produced by Dichlorethylsulphide (Mustard Gas). *Jour. Lab. and Clin. Med.*, v. 4, p. 785.

#### PATHOLOGY.

Brückner. Cytology of the Eye. Heidelberg Congress, 1916. *Abst. Zeit. f. Augenh.*, v. 36, p. 97.

Lippmann, H., and Bruckner, A. Local Formation of Lymphocytic Cells in Dogs' Eyes. *Abst. Klin. M. f. Augenh.*, v. 60, p. 411.

#### GENERAL DISEASES.

Charles, J. W., and Lamb, H. D. Results from 112 Wassermann Blood Tests in Missouri School for Blind. *Arch. of Ophth.*, v. 47, p. 454.

Crossley, E. R. Multiple Sclerosis with Eye Findings. *Ill. Med. Jour.*, v. 34, p. 209.

Eyer, A. Eye Complications in Little's Disease. *Münch. Diss.*

Faith, T. Local Infection in Relation to Diseases of Eye. *Ill. Med. Jour.*, v. 34, p. 193.

Galtung, A. Rhinogenous Ocular Affections. *Abst. Klin. M. f. Augenh.*, v. 60, p. 415.

Gjessing, H. Tuberculosis in Eye, and Use of Tuberculin. *Abst. Klin. M. f. Augenh.*, v. 60, p. 668.

v. Hippel. Pseudotuberculosis of Eyes. *Abst. Klin. M. f. Augenh.*, v. 60, p. 223.

Illig. Eye Symptoms in Aphthae Epizooticae in Men. *Abst. Klin. M. f. Augenh.*, v. 60, p. 701.

Kehrer, F. Psychogenic Disturbances in Vision and Hearing. *Abst. Klin. M. f. Augenh.*, v. 60, pp. 128, 284.

Maxwell, E. M. Observations in Eye Conditions Met with in Malta. (2 ill. Bibl.) *Brit. Jour. Ophth.*, v. 2, pp. 469, 516.

Kirk, J. Malaria and Eye Disease. *Brit. Med. Jour.*, Aug. 3, 1918, p. 110.

Klinedienst, J. F. Herpes Zoster Ophthalmicus. (Dis.) *Penn. Med. Jour.*, v. 21, p. 752.

Oloff, H. Rare Findings in Multiple Sclerosis. *Abst. Klin. M. f. Augenh.*, v. 60, p. 414.

Raeder, G. Sympathetic Lesions of Intracranial Localization. (Ptosis and Miosis.) (4 ill.) *Norsk Mag. for Laegevid.*, v. 79, p. 1015.

Schurmann, R. Hereditary Ocular Syphilis. *Abst. Klin. M. f. Augenh.*, v. 60, p. 838.

Strasburger, J. Ocular Lesions. Weil's Disease. *Abst. Klin. M. f. Augenh.*, v. 60, p. 838.

Unthoff, W. War Neuroses in Ophthalmology. *Münch. med. Woch.*, Jan. 15, 1918, p. 80. *Abst. Klin. M. f. Augenh.*, v. 60, p. 414.

Uribe-Troncoso, M. Tumor of Sphenoid with Ocular Manifestations. (Dis.) *Arch. of Ophth.*, v. 47, p. 510.

Wessely. Myasthenia Gravis. *Münch. med. Woch.*, Oct., 1917, p. 1621. *Abst. Klin. M. f. Augenh.*, v. 60, p. 284.

#### HYGIENE.

Crain, A. B. Trachoma as a Public Health Problem. *Texas State Journal Med.*, 'v. 14, p. 229.

Nance, W. O. Eye Injuries that Can be Prevented. *Ill. Med. Jour.*, v. 34, p. 199.

Oppenheimer. War Spectacles. *Deut. med. Woch.*, 1918, p. 550. *Abst. Klin. M. f. Augenh.*, v. 60, p. 843.

Report of Commission on Conservation of Vision. *Penn. Med. Jour.*, v. 21, p. 785.

Stricker, L. Blindness in Hamilton County, Ohio. Studies from the Helen S. Trounistine Foundation, Vol. 1, No. 3, Cincinnati, Ohio.

#### PROFESSIONAL RELATIONS, SOCIOLOGY AND HISTORY.

Berens, C. Need of Ophthalmologic Clinic in Penal Institutions. *Arch. of Ophth.*, v. 47, p. 448.

Collins, W. J. Sir William Lawrence. (1 ill.) *Brit. Jour. Ophth.*, v. 2, p. 497.

Commission to Study Problems of Blind. *Abst. Klin. M. f. Augenh.*, v. 60, p. 719.

Duane, A. How May Physical Standards of the Service Profitably be Modified? Sec. on Ophth., A. M. A., 1918, p. 11.

Fagin, R. Eye Requirements for Aviators. *Jour. Tenn. State Med. Assn.*, v. 11, p. 117.

Greeff. Field Glasses. *Abst. Klin. M. f. Augenh.*, v. 60, p. 662.

Carlo Dati and Invention of Spectacles. *Abst. Klin. M. f. Augenh.*, v. 60, p. 288.

The letters of Francesco Redi on the Invention of Glasses. *Abst. Klin. M. f. Augenh.*, v. 60, p. 662.

C. A. Manzini's "L'Occhiale all'occhio (1660)." *Abst. Klin. M. f. Augenh.*, v. 60, p. 829.

Technical Task for Optical Science. *Abst. Klin. M. f. Augenh.*, v. 60, p. 826.

McKee, S. H. Some Aspects of Military Ophthalmology. *Bull. Canadian Army Med. Corps*, v. 1, p. 87.

Moret. Vision and Fitness for Service. *Arch. Med. Belges*, v. 71, p. 47.

Mok. Ocular Efficiency in Military Service. *Abst. Klin. M. f. Augenh.*, v. 60, p. 422.

Pockley, F. A. Soldiers Eyesight. *Med. Jour. Australia*, 1918, Aug. 31st, p. 194.

Robertson, C. M. Examination of Men Entering Aviation Service. *Jour. Amer. Med. Assn.*, v. 71, p. 813.

Schweinitz, G. E. de. Some Aspects of Military Ophthalmic Surgery and Practice. Sec. on Ophth., A. M. A., 1918, p. 266.

Silex. Livelihood on Farm for War Blind. *Abst. Klin. M. f. Augenh.*, v. 60, p. 426.

Stuelp. Ocular Requirements for Military Service. *Abst. Klin. M. f. Augenh.*, v. 60, p. 422.

Welfare of Blinded Soldiers and Sailors. *Brit. Jour. Ophth.*, v. 2, p. 291.

# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 1

DECEMBER, 1918

No. 12

## ORGANIZATION AND DEVELOPMENT OF THE SCHOOL OF OPHTHALMOLOGY.

U. S. GENERAL HOSPITAL, No. 14, FORT OGLETHORPE, GA.

G. E. DE SCHWEINITZ, LT.-COLONEL, M. C., U. S. A.

Authority to publish granted, Board of Publications, S.G.O., October 30, 1918.

The present article does not concern itself with the various courses of instruction in medicine, surgery and sanitary science in the Medical Officers' Training Camp in Camp Greenleaf, Chickamauga Park, Georgia, but only as the title indicates, with the School of Ophthalmology.

Prior to its organization, this school had been in contemplation for a considerable period of time. Therefore, from June 15th to June 20th, 1918, with the approval of Colonel E. L. Munson (now Brigadier General), Commandant of the Camp, the writer made a preliminary survey of the available buildings and the clinical material, the possible courses of instruction in ophthalmic work and in cooperation with other schools already established, or in process of establishment, the laboratory facilities, the staff required, and the standards for admission. The results of this survey, incorporated in a report which was submitted to the Surgeon General and to the Commandant of the Camp, were approved.

On July 23d the writer was directed to proceed to Philadelphia for the purpose of collecting the necessary equipment, and upon completion of this duty to proceed to the following named places for the purpose of organizing the ophthalmic instruction, to-wit: Camp Greenleaf, Chickamauga Park, Ga., and U. S. General Hospital, No. 14, Fort Oglethorpe, Ga., and upon

completion thereof to return to his proper station in Washington. Pursuant to this order, the writer, after collecting the equipment, to which reference will be made later, proceeded to Fort Oglethorpe, Ga., and immediately began the work of organization of the Ophthalmic School which he had been directed to undertake.

*The Building.*—A new two-story ward-building was placed at the disposal of this work, to which building, after completion of the necessary alterations, the Ophthalmic Service was transferred. It is now officially known as Ward 30, Division A, of U. S. General Hospital, No. 14. The first floor has been arranged and equipped as follows:

There are two rooms for refraction, each provided with trial cases, standard test-type cards, all the necessary apparatus for muscle testing, and with blackboards utilized during the hours of instruction. Should it become necessary, additional apparatus can readily be installed.

Adjoining the rooms for refraction, eight stalls for retinoscopy and ophthalmoscopy were erected. These stalls face a large room where the class of student officers may gather during the hours of didactic instruction and lantern-demonstration, and where perimetry is taught and practised. The stalls for retinoscopy and ophthalmoscopy are hung with heavy curtains,



which can be drawn aside or not, as the conditions require; and in the central one a lantern screen is readily adjusted, its dark surroundings enhancing the distinctness of the pictures. If necessary, the lantern can be moved to either of the refraction rooms, and there used in the lectures on the theory of refraction and physiologic optics. The refraction room, and the one containing the retinoscopy stalls are in communication with it through a doorway. There is a large room in one end of which the appliances for the practical optician's work are stationed, and where all of the adjustment is made of the spectacle frames in which the lenses, ground according to the formulas furnished by the ophthalmologists, are mounted. In this room, as at present arranged, are also the tables for the clinical clerk, who records each patient referred to the Service and who makes the preliminary visual tests, takes the history, etc. Between the area devoted to the optician's work-table and the record-table there is ample space and equipment for the treatment of the external diseases of the eye. This room communicates by a double doorway with a covered porch which runs the whole length of the building, and which was utilized during the summer as a waiting-room. Should this prove not to be practical in the winter, space for a waiting-room can be provided within the building itself.

Facing the large room previously described are a room for operations on animals' eyes (pigs' eyes, sheep's heads, etc.), a small, well-equipped room for operations on human eyes, and an office for the Chief of Service and for storing the records. A commodious, admirably-appointed operating room in the Oto-Laryngological Building, which adjoins the Eye Ward, is also at the service of the ophthalmologic staff. Operations requiring general anesthesia are here performed.

In the remaining space of the first floor of the Eye Building is situated a ward of sixteen beds; but should additional beds be required, they can be secured in a long ward which occupies the entire second floor of the structure.

Rooms for nurses, linen, toilets, etc., have their usual relationship to these wards.

Such an arrangement of communicating rooms renders the examination and the assortment of patients easy; and is advantageous in the division of the student officers into classes, according to the work to which they are assigned; that is, the treatment of external diseases of the eye, perimetry, retinoscopy, ophthalmoscopy, ward instruction, operations, refraction, etc.

*Equipment.*—In addition to the usual equipment for an active Eye Service which is to be utilized in teaching, to-wit: trial cases, perimeters, surgical instruments, stereoscopes, giant magnets, tonometer, etc., certain special equipment was procured, as follows: (1) A lantern for the projection of opaque objects and slides; (2) several hundred lantern slides, for the most part duplicates of those used by Lieut. Col. de Schweinitz in the University of Pennsylvania, to which, through the kindness of Dr. Howard F. Hansell and Dr. William M. Sweet, a number of slides were added, duplicates of those employed in the Jefferson Medical College; (3) about 200 microscopic slides illustrating the histology and pathology of the eye, being duplicates from the collection of Lieut. Col. de Schweinitz in his laboratory at the University of Pennsylvania; (4) sets of Oatman's plates ("Diagnostics of the Fundus Oculi"), with the necessary stereoscopes; (5) a thermophor.

*The Clinical Material.*—The material for the clinic and the course of instruction is obtained (a) from the regular dispensary service of U. S. General Hospital No. 14; (b) from the patients in the eye-ward of the same hospital; (c) from the recruits as they are examined in the Camp Infirmary of Camp Greenleaf and the Recruit Depot at Lyle; (d) from the patients in the general medical, surgical and the neurological wards of U. S. General Hospital No. 14.

*The Student Officers.*—The student officers in the Medical Officers' Training Camp are assigned to the various schools in operation according as they

qualify in the preliminary examinations, which are held daily for the purpose of making this selection. The largest number of those who find entrance into the School of Ophthalmology have, prior to their assignment to Camp Greenleaf, been "exempt to ophthalmology," on the files of the Surgeon General's Office; but a certain number are selected from among those who have entered the service without such exemption, but who at their original investigation on arrival at the Camp have expressed a preference for this special type of medical and surgical work. The preliminary entrance examinations are always conducted either by the Director of the School of Ophthalmology, or by one of his staff, and should the applicant qualify for the school, as soon as he has completed his period of military training he receives his assignment, these assignments being made on the first and fifteenth of each month.

*Length and Outline of the Course.*—The length of the course is four weeks. The hours of instruction are daily from 9:30 to 11:30 A. M. and from 1.30 to 4:30 P. M., except on Saturdays, when the instruction, which consists in a series of quizzes covering the week's work, concludes at 11:30 A. M.

The outline of the course may be briefly summarized, as follows: Two hours daily, except on Saturdays, of systematic didactic teaching, including a review of the theory of refraction, muscle testing, other functional testing, anatomy and histology of the eye and its appendages, external diseases, ophthalmoscopy, ophthalmic neurology and operations. These lectures are illustrated by means of the lantern, diagrams, freehand drawings, etc. Particularizing as to the days: On Mondays and Tuesdays three and one-half, and on Wednesdays, Thursdays and Fridays one and one-half hours are devoted to practical instruction in refraction, muscle testing and diseases of the eye. On Wednesdays, Thursdays and Fridays two hours on each day are devoted to operative ophthalmology, the Director or one of the staff performing operations on the patients who come to

the Eye Service in General Hospital No. 14, and on patients referred to the Director through the courtesy of one of the eye surgeons in Chattanooga. The student officers themselves perform the usual operations on pigs' eyes and sheep's heads.

During each course two lectures of two hours each are given to the combined class of ophthalmology and otolaryngology, one on the eye complications of sinus and mastoid diseases, and one devoted to the subject from the standpoint of the otolaryngologist. At the request of the Director of the School of General Surgery, two lectures are given to his classes during the course on the treatment of injuries of the eye, and two hours per week are devoted to practical work in ophthalmoscopy.

During the course two hours are set aside for instruction in the bacteriology and pathology of the eye; and this instruction is given in conjunction with the Department of Pathology, and concerns itself with the study of the sections to which reference has been made and with the bacteriologic examinations of the conjunctival sac, corneal ulcers, etc. One hour is devoted during the course to X-ray localization of foreign bodies in the eye, under the auspices of the X-ray department. Thru the courtesy of the Department of Surgery, the Class in Ophthalmology has the opportunity of devoting one hour daily to eye work in the genito-urinary ward of U. S. General Hospital No. 14, going to these wards in sections, and having the advantage, therefore, of studying the specific infections of the eye. The same opportunity, and in a similar manner, is afforded the class in the medical, neurologic and surgical wards of the hospital, whereby a wide range of ophthalmoscopic work is covered.

Each Saturday morning a quiz is conducted by the Director and instructors, one hour for the class as a whole, and one hour for sections of the class. The quizzes are both oral and written, and the week's work is reviewed. During ward instruction practical paper work, the method of keeping records

and cross-indexing is demonstrated. Naturally, the schedule of instruction is elastic, and the number of hours assigned to any particular topic may be altered as is deemed necessary.

*Examinations.*—The examinations for entrance into the School of Ophthalmology have been briefly referred to. At the conclusion of each four weeks' course the student officers of the class are graded according to their personality, according to the character of their work, both practical and theoretical, of which cognizance has been taken by each instructor, who turns in his report on each officer with whose work he has been specially concerned, and according to an examination which is both oral and written. All reports and examination papers are reviewed by the Director of the School, who determines the grade. It is upon this final examination, thus arranged, that the officer's ultimate retention for ophthalmic work in the army is based.

*The Ophthalmic Staff.*—It was determined that the personnel of the Ophthalmic Staff should consist of a Director of the School who should also be Chief of the Ophthalmic Service of U. S. General Hospital No. 14, and eight instructors, one of whom should also act as Ward Surgeon. Naturally the number of instructors is subject to change, according to the needs of the school and the character of the classes. The instructors were carefully selected according to their qualifications, determined by their records as teachers and practical ophthalmic surgeons in civilian life, prior to their entrance into the Medical Corps of the Army.

Owing to the cordial coöperation of Colonel (now Brigadier General) E. L. Munson, then Commandant of the Camp; Colonel Robert Brooke, Senior Camp Instructor; Colonel Gregory, Commanding Officer, Medical Officers' Training Camp; Lt. Colonel Havercamp, then Commanding Officer of U. S. General Hospital No. 14, and the excellent help of Major Meyer Wiener, Captain Alfred Cowan, and Lieutenant M. E. Brownell, and much aided by Lt. Colonel Edward Martin, Director of the School of Surgery and Chief of the

Surgical Service of U. S. General Hospital No. 14, and Lt. Colonel Thomas J. Harris, Director of the School of Otolaryngology which had been in flourishing operation for several months, the work of organization proceeded rapidly.

On August 7, 1918, preliminary lectures and demonstrations were begun, and on August 12, 1918, the formal opening of the School took place. On August 22, 1918, the School having been in full and smooth operation for nearly two weeks, the writer, with the approval of the Commandant, confirmed by the Surgeon General's Office, Division of Surgery of the Head, turned it over to Major Meyer Wiener as Director, who has since that time, with skill and fidelity, conducted its affairs according to the plans which have been outlined. The Staff at present is as follows:

Major Meyer Wiener, Director and Chief of Service.

Major H. M. Morton, Instructor.

Captain Alfred Cowan, Instructor.

Captain S. T. Hubbard, Instructor.

Lieutenant M. E. Brownell, Instructor.

Lieutenant L. G. Campbell, Instructor.

Lieutenant C. P. Dyer, Instructor and Ward Surgeon.

Lieutenant T. J. Moran,<sup>1</sup> Instructor.

Lieutenant F. O. Schwartz, Instructor.

The School of Ophthalmology has been organized and is in operation for the purpose of training ophthalmologists who have entered the service as such and are assigned to the Medical Officers' Training Camp for instruction. It affords to student officers, even tho they have in civilian life devoted long periods of time to eye work, an opportunity for postgraduate ophthalmic instruction which has proved to be of the utmost service. It permits all those who are engaged in this work, either as instructors or as student officers, to approach their duties from the

<sup>1</sup> Lieutenant Moran died during the recent epidemic of influenza. He was an accomplished officer and an admirable teacher.



military standpoint and its necessities, not only as they exist here, but as they obtain overseas. The advantage of observing and learning the technic of the ocular examination of recruits and registrants is a good example of the type of such work. In so far as possible, emphasis has been placed on the instruction which fits the officers for ophthalmologic service abroad. In this respect the observations which the writer was able to make during several months of inspection in France and England of British, French and our own hospital systems, have been utilized in preparing the schedules of instruction, supplemented by advices received from time to time from the overseas eye service.

A feature of importance in the School of Ophthalmology is the work which has been maintained in coöperation with the other schools at Fort Oglethorpe, to which reference has already been made, notably the School of Surgery and Anatomy, the School of Otolaryngology, the X-ray Department, and the Departments of Pathology and Bacteriology. The excellent opportunities for medical ophthalmoscopy in the wards of U. S. General Hospital No. 14 have been noted. The recently established School of Oral and Plastic Surgery has already made it possible for the student officers of the Ophthalmic Classes to learn in a broad sense the principles of plastic surgery so necessary in acquiring the technic of blepharoplastic work—operative work of the utmost importance in ophthalmic war surgery.

The School and its work puts the Surgeon General's Office in possession of information according to which requests for the assignment of ophthalmologists to various base hospitals in this country and base and evacuation hospitals abroad can be made with an intelligent understanding of their capabilities, because each week the records of the student officers in practical work and their grades acquired according to examinations are transmitted to those who are responsible for their assignment.

As has been pointed out, the preliminary examinations for entrance into the School of Ophthalmology decide whether it is desirable that the student officer shall enter the class for ophthalmic training, or whether his acquirements are such that he can be more suitably employed in some other department of military medical or sanitary science. These examinations further decide whether the previous training and experience of the student officer in civilian life has been such that it is unnecessary for him to add to his ophthalmic qualifications, i. e., whether he shall be at the conclusion of his military training immediately assigned to ophthalmic duties here or abroad. But for those who enter the school it is the final examination after the completion of the course which determines whether an officer shall continue his work in the army as an ophthalmic surgeon, or shall be assigned to other types of work for which he is more definitely suited.

The clinical material which has been available for this school has been unusually rich, largely on account of the permission which was granted that the recruits who are examined, as before stated, shall be utilized for ophthalmic examination. The cases which come under observation and those retained for treatment compare favorably with those in any active ophthalmic service in civilian life.

Altho the number of operations on human eyes is comparatively limited, excellent material in this respect is available, and all the important ophthalmic operations are readily demonstrated by means of sheep's heads and pigs' eyes, and not only demonstrated, but the student officers themselves are given the opportunity to perform them. The pigs' eyes are removed with all of their orbital attachments and surrounded by a considerable area of the skin, and therefore with complete preservation of the lids, making it possible to perform the important ophthalmic operations exactly as if they were being done on the human subject. This method of using pigs' eyes is due to the ingenious thought of the present

Director of the School of Ophthalmology.

Prior to the establishment of the Ophthalmic School the attendance in the Eye Service was about 260 new patients a month. This attendance has rapidly increased until at the present time the new patients per month amount to between 500 and 600, and during periods when large numbers of recruits are sent from the Recruit Depot and Camp Infirmary for examination, (and all of the recruits presenting interesting ocular findings are referred to the eye clinic) as many as 1,500 new

patients have been examined in one month. Naturally, the recruits are not retained as patients, but none the less they are utilized in the ophthalmic instruction.

Under the supervision of the present Commandant of Camp Greenleaf, Colonel W. N. Bispham, and the effective administration of Major Wiener and his staff, the school has steadily increased in value and may justly claim an honorable position in the work of the Medical Corps of the United States Army.

## OPHTHALMOSCOPIC CONDITIONS SIMULATING SARCOMA OF THE CHOROID.

HARRY FRIEDENWALD, M. D., F. A. C. S.

BALTIMORE, MD.

Report of two cases resembling sarcoma of choroid in which after enucleation the pathologic diagnoses were granuloma of the choroid and tumor formation associated with retinitis and massive exudation, with citation of cases more or less similar recorded in the literature. With two plates and illustration in the text. Read before the American Ophthalmological Society, July 10, 1918.

The diagnosis of choroidal sarcoma may be difficult. The tumor may be hidden in front of the ophthalmoscopic field, or behind a detached retina. But when a neoplasm is clearly seen within the eyeball by means of the ophthalmoscope, the only question which ordinarily arises is, whether it is a choroidal sarcoma or a retinal glioma. Other forms of neoplasm are of such rare occurrence that they are scarcely ever taken into consideration. And the differentiation between sarcoma and glioma is ordinarily determined by the age of the patient, as well as by the difference in the appearance of the growths.

In reporting the following cases, I believe that I am presenting conditions of unusual rarity, the character of which could be definitely established only by pathologic examination.

CASE I.—The patient, a young girl, had been under the care of Dr. Louis P. Hamburger since the beginning of 1908. She was then eleven years of

age and consulted him because of headache. The diagnosis was neurasthenia. Her family history was negative. The patient had had measles, chickenpox and whooping cough. She was a girl of small build, fairly well nourished. There were occasional choreiform movements about the head, mouth and eyelids. A complete examination was negative in all other respects. In spite of the treatment, the condition remained the same and the chorea became more active at times. During 1914 she was seen by Dr. Hamburger a number of times because of the constant headache, and in December she was under the care of Dr. Sydney M. Cone for scoliosis.

The patient was first seen by me in November, 1900, when she was brought for a slight blepharitis. I saw her again June, 1904, at which time she complained that the eyes pained her when reading; both eyes had perfect vision and a very low degree of hyperopia. In November, 1907, she was

again examined and her glasses were changed. At this time an examination was made under atropin, and her hyperopia was found to be 1.50 in each eye, with perfect vision.

In January and February, 1911, she was again examined and again the same hyperopia was found. The right eye showed, +1.5, vision 6/4, almost perfect; left eye +1.5  $\ominus$  -0.5 c. ax. 120°, vision 6/4, almost perfect. The left glass was changed to correspond with this examination.

In January, 1912, another examination was made because of eye ache and of blurred vision; but I found perfect vision in each eye with the correcting glasses.

On March 7, 1915 (her age was then 18), she again came to consult me and complained of circles and flashes of light seen frequently in the right eye. The vision of the left was perfect. The central vision of the right eye was almost perfect, not quite as good as that of the left.

Examining the fundus of the right eye, I found in the upper nasal quadrant, reaching to a point near the upper inner margin of the disc, a large bluish-gray, rounded, elevated mass, the highest part of which could be seen with +12 D. The projection of the growth was therefore, about 10 D into the vitreous, indicating a thickness of a little more than 2 mm. The extent of the growth is six or eight times that of the optic disc.

An examination of the field of vision taken March 8, 1915, showed a large defect including the blind spot; and reaching downward to a meridian 30° below the horizontal, and upward to a meridian almost 60° from the horizontal. The outlines of the field are otherwise normal. (See Fig. 1.)

March 10, 1915. I advised the patient to consult Dr. de Schweinitz, informing him that I regarded the neoplasm as a sarcoma. I had never seen a choroidal sarcoma in a patient as young as this patient, and I was not willing to enucleate without having the diagnosis corroborated.

On March 12, 1915, Dr. de Schweinitz wrote as follows: "I am not at all

sure, or perhaps I should say not quite sure, that the lesion is a sarcoma. Naturally, the first diagnosis, as you point out, would be leucosarcoma, but I have seen, and doubtless you have, for I think you have studied the case also, one patient with a very similar looking lesion, under the care of Randolph, with a diagnosis made over and over again of leucosarcoma, which was certainly inaccurate, as years have gone by, and there never has been any development of the condition of affairs.

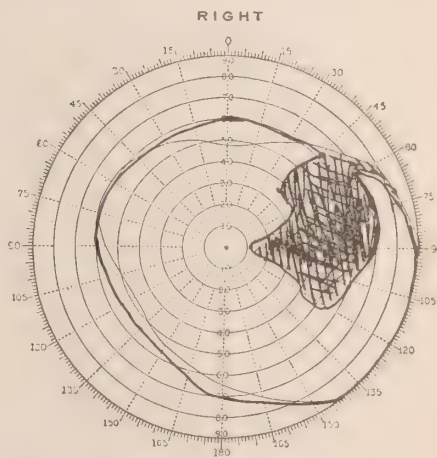


Fig. 1. Field of vision, Case I, March, 8th, 1918.

To be sure, it might be a tuberculous process, in which case the condition would be equally unfortunate for the young woman; but I cannot divest myself of the opinion that it may be some other pathologic lesion, a very unusual form of exudation perhaps with cyst formation. To put it in other words, if this patient were under my care, I would state with frankness the possibility of other processes being present, and that in these circumstances it would seem to me justifiable, for a time to keep the case under observation. I do not believe, even if it proves to be a sarcoma, that such a course, now usually called watchful waiting, is unjustifiable." He suggested a trial with radium.

Doctor Louis P. Hamburger, who had the case under observation for several years, was consulted, and it was agreed to have a subcutaneous tuber-



culin test made. She was admitted into the hospital for this purpose; the test was quite negative. The patient was observed carefully, almost daily, and the impression was that the growth was becoming larger. On March 15, 1915, I noted that since last seen, there was an increase of detachment between the papilla and the neoplasm. The detachment reached up to the disc. There was a very small hemorrhagic extravasation on the surface. Where there had at first been fine hemorrhagic points, there was now a mass looking like confluence of a number of these points. On March 25, 1915, the patient consulted Dr. Theobald, from whom I received the following opinion:

"I examined Miss C's eye with interest, and I cannot make anything out of it except an intraocular growth—in all probability a sarcoma. It is, for the most part, so sharply defined that it does not resemble the inflammatory conditions which sometimes lead us into a mistaken diagnosis of tumor. It is true that the tension is rather below than above normal, but this, of course, is sometimes the case with an intraocular growth. It seems to me that the early enucleation is indicated, for much may be gained by this, and as the sight of the eye, in any case, is doomed, there is little or nothing to be lost."

March 25, 1915. The hemorrhagic spot disappeared. The surface could still be seen with +12 D.

Following the suggestion of Dr. de Schweinitz applications of radium were made to the eye. The treatment was made possible thru the kindness of Doctor C. F. Burnam of the Howard A. Kelly Institute. There were several "massive applications." During this period the eye was watched carefully, but it was not evident that it effected any distinct changes. I therefore advised enucleation of the eye, and the operation was performed on April 11, 1915. The eyeball was given to Dr. Standish McCleary, Professor of Pathology at the University of Maryland. It is proper to mention that when a preliminary report was received from Dr. McCleary on April 20th, I arranged to have a Wassermann test made; for

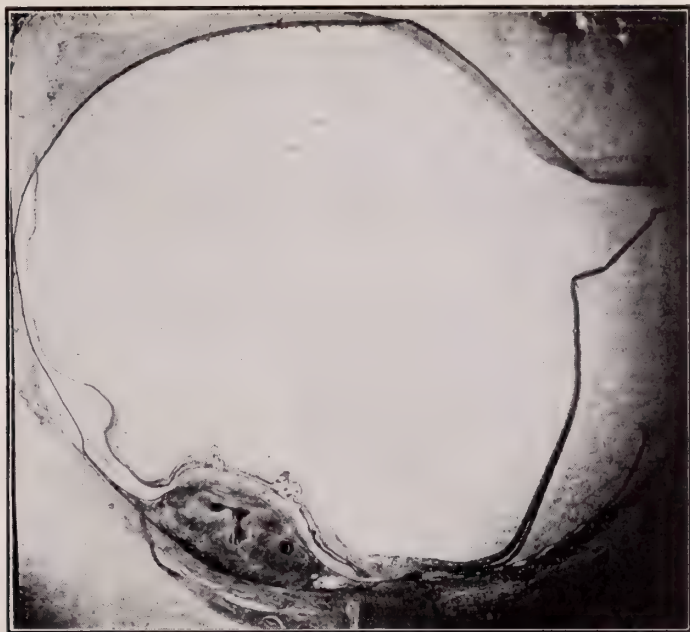
various reasons this had been regarded as unnecessary before the operation. The result of the test was received a few days later as "doubtful." Dr. Charles E. Simon advised that mercury be given for one week, when a second Wassermann was made, which was absolutely negative. (May 5, '15.) Dr. McCleary reported:

"There is an elliptical mass of tissue on the nasal side of the disc, on the plane of the optic nerve, 0.5 cm. by 0.75 cm., projecting into the interior of the eye. This mass is internal to the choroid and has pushed the retina away from that tunic, causing a destruction of the pigment layer of the retina over the summit of the growth. Under low magnification, the tissue mass is seen to be made up of a number of smaller nodules, each having a distinctly zonal arrangement of its component parts. Two of these nodules are degenerated at the center. The tissue is poorly supplied with blood vessels. Several giant cells of the foreign body type can be seen. The picture is typically that of an infectious granuloma; tuberculosis or syphilis. For examination with higher objectives, sections were also stained to demonstrate tubercle bacillus and treponema pallidum. Most careful search failed to disclose the presence of either organism.

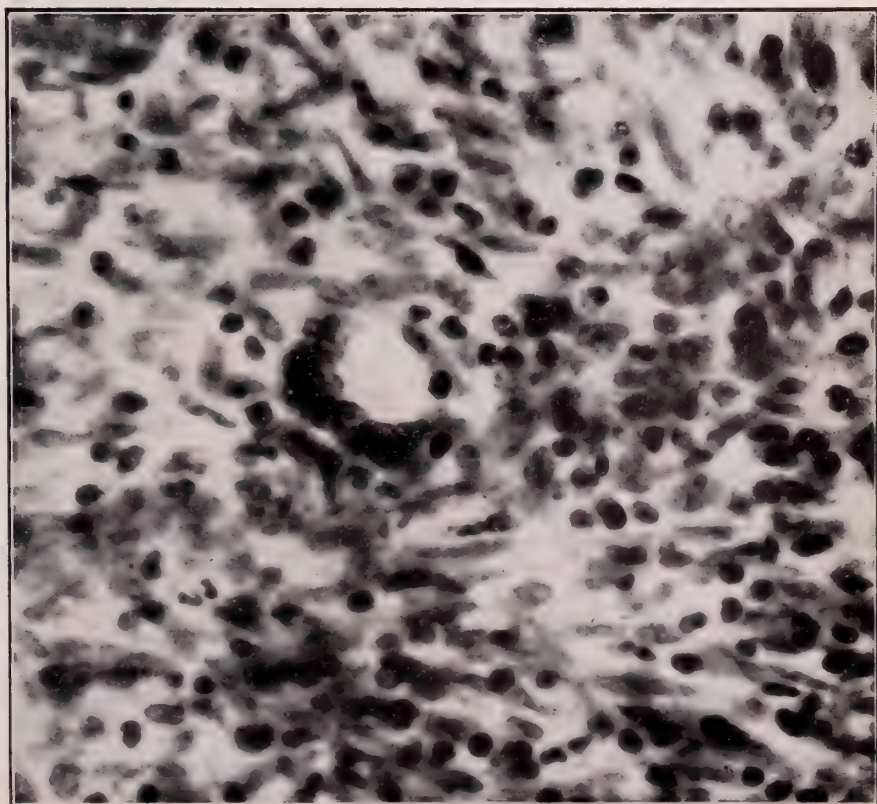
"Under high magnification, the nodules consist of lymphocytes, endothelial leucocytes, plasma cells and a reticulum of fibroblasts and collagen fibrils. A few chromatophores are present in the portion nearest the choroid.

"Two of the component nodules of the mass show areas of necrosis, with typical karyorhexis and caseation. That portion of the growth nearest the retina shows a much more advanced development of the fibrous tissue and here the pigment layer of the retina has disappeared. There is an exudate separating the pigmented and neuroepithelial layers of the retina at each extremity of the growth.

"This exudate is composed of serum in which are lymphocytes and endothelial leucocytes. The structure and arrangement of the mass is characteris-



SECTION OF EYEBALL. CASE I, SHOWING TUMOR AT MARGIN  
OF OPTIC DISC



PART OF ABOVE MASS UNDER HIGH POWER SHOWING  
GIANT CELL IN CENTER





tically inflammatory and nowhere is there the slightest suggestion of true tumor structure. With the von Pirquet and Wassermann tests both negative, and the failure to find either the tubercle bacillus or treponema pallidum in the sections, one is not justified in calling the growth either tuberculous or syphilitic, yet the structure is such that one of the two is guilty if not proven."

I submitted sections to Dr. Verhoeff who very kindly gave me the following statement, "that the tumor is in all probability a solitary tubercle of the choroid. If you will stain a large number of sections differentially you ought to be able to find some tubercle bacilli in them." (This was done without result.)

Dr. de Schweinitz, to whom I had likewise sent sections, submitted them to Professor Allen Smith of the University of Pennsylvania, who made the following report, which Dr. de Schweinitz had the kindness to send me:

"Section of eye shows as the important lesion a small mass developed from the choroid close to the nerve. This, which at first glance strongly suggests a diagnosis of sarcoma, is apparently entirely inflammatory. In the section examined there is a central focus of more or less fragmented polynuclear leucocytes with a developing fibroblastic wall about it. At one point the pus has apparently broken thru the latter and a secondary suppurating focus is developing at the margin of the first. Lateral to these (one on each side in the section) are two fairly defined cellular divisions of the mass, in one of which a smaller but recognizable center of suppuration is forming. All these are enveloped in a mass of round and spindle cells, some of which near the choroidal base of the growth, are pigmented; some are ordinary young connective tissue cells, some from their size and the vesicular type of their nuclei of endothelial origin, some of the type of small mononuclear leucocytes; and close to the necrotic and suppurative centers there is more or less definite polynuclear leuco-

cytic infiltration. The mass is not well vascularized but at places angioblasts are evident, and the small choroidal vessels at the base of the growth show distinct enlargement of their endothelial cells.

"I have hesitated somewhat in concluding as to the suppurating character of the central foci mentioned; but have insufficient basis to conclude otherwise, altho the material in its staining shows too much chromatin material preserved to be entirely typical. I do not, however, hesitate to distinguish the process as inflammatory rather than neoplastic."

Since the eye was enucleated the patient has been progressing fairly satisfactorily so far as her general health is concerned, tho she still complains of frequent and at times severe headaches.

In reviewing the case just described, a number of features should be discussed. The diagnosis of choroidal sarcoma in a patient of 18 years must arouse suspicion. Still we must bear in mind that Kerschbaumer<sup>1</sup> in her work on sarcoma of the eye, in which she reported on sixty-seven cases, found two cases in children, and several cases in persons under thirty.

[The three cases under 20 years of age are the following: Case 12, a child not over one year of age with epibulbar melanosarcoma; case 27, a male aged 3, with angiosarcoma of choroid and case 20, a girl of 16 with spindle cell sarcoma arising in the ciliary body and invading the choroid.]

Syphilitic growths within the eyeball are of very rare occurrence, if we are to judge from the published accounts. I have been able to find only the following references:

According to Baas<sup>2</sup> true gumma of the choroid had been established in only a single case, in that of Schoebl; and there were no true cases of retinal gummata that had been definitely proved, tho there were clinical observations.

Parsons<sup>3</sup> says: "True gummata of the choroid characterized by necrosis are of extreme rarity. . . . Only gummatous infiltration has hitherto been observed."

Groenouw<sup>4</sup> states that gummata of the choroid and the retina are very rare; they have the appearance of prominent white masses which arise in the choroid and invade the retina secondarily; they are usually accompanied by iritis, optic neuritis, retinal hemorrhages and bulging of the sclera.<sup>5\*</sup> It is evident that this picture is quite different from that described in the case reported.

Lawson<sup>6</sup> reported a large elevated mass at margin of disc containing cholesterin crystals, with extensive choroidoretinitis. The case was probably one of the group of Retinitis with Massive Exudate.

Alexander<sup>8</sup> records the case of a male aged 42, who had pronounced luetic symptoms. The right eye was badly affected with vitreous opacities; and after these had cleared up, two elevations could be seen. They were evidently very small, not reaching more than 1mm. or 1½ mm. into the interior. They disappeared under continued antisyphilitic treatment.

Hirschberg<sup>10</sup> describes two cases; both were severe forms of lues. In both there were large, prominent, rapidly enlarging choroidal masses, producing intense vitreous opacities. The optic nerve was very congested.

Gutmann<sup>11</sup> found an oval neoplasm near the macula with hemorrhages in the retina round about, and a paracentral scotoma.

Alt<sup>12</sup> reported cases probably cured.

Hanssen<sup>13</sup> reported a case reviewed in *The Ophthalmic Year Book*, v. 13, p. 140.

The possibility that the growth was a conglomerate tubercle must also be considered. This condition is likewise exceedingly rare. It is commonly associated with other manifestations of tuberculosis. Such tumors have been generally described as whitish or yellowish white in appearance; in a few instances this has led to the enucleation of the eye-ball under the diagnosis of glioma.

Spalding<sup>14</sup> removed an eye because of supposed glioma and found conglomerate tubercle on pathologic examination. Natanson<sup>15</sup> reports two cases of

conglomerate tubercle in early childhood in one of which the diagnosis was glioma. Salzmann<sup>16</sup> in 1911 reported a similar error in diagnosis.

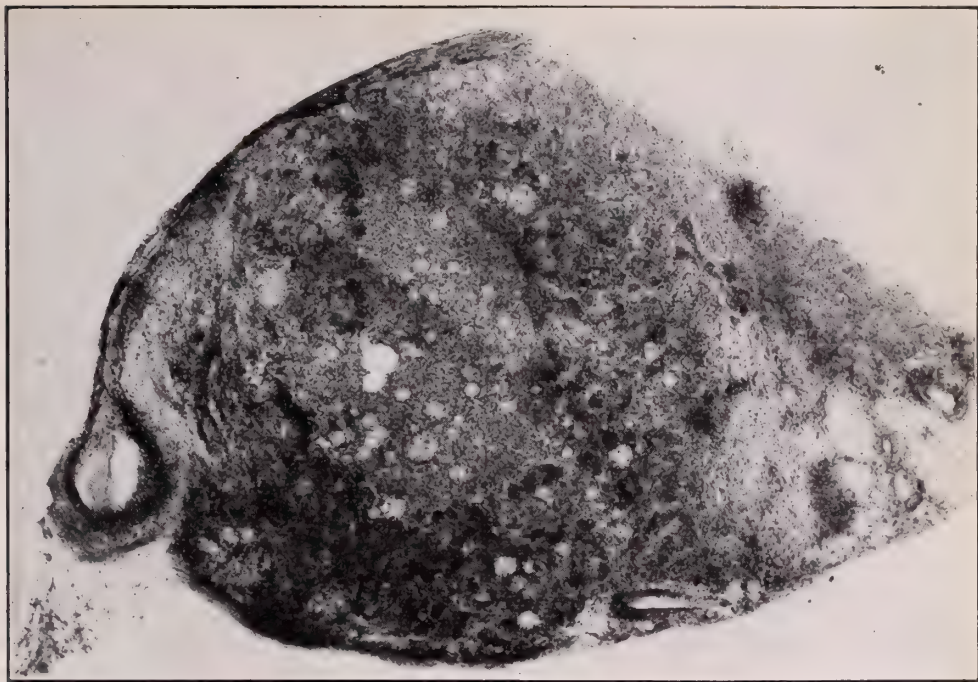
In the neighborhood of the tuberculous neoplasm there have usually been small miliary deposits. Finally these tumors are ordinarily complicated by signs of inflammation of the conjunctiva, cornea or iris. It is true that a few cases have been recorded in which there has been complete absence of such complications; as in the cases noted by Natanson: Rogman, Solomon, Emanuel and Dupuy-Dutemps and his own. Parsons suggests that a solitary tubercle of the choroid may also simulate a choroidal sarcoma. It is evident that there are cases in which the correct diagnosis can be made only by pathologic examination.

For discussion of conglomerate tubercle of choroid see Groenouw,<sup>17</sup> Parsons,<sup>18</sup> and Lubarsch-Ostertag.<sup>19</sup>

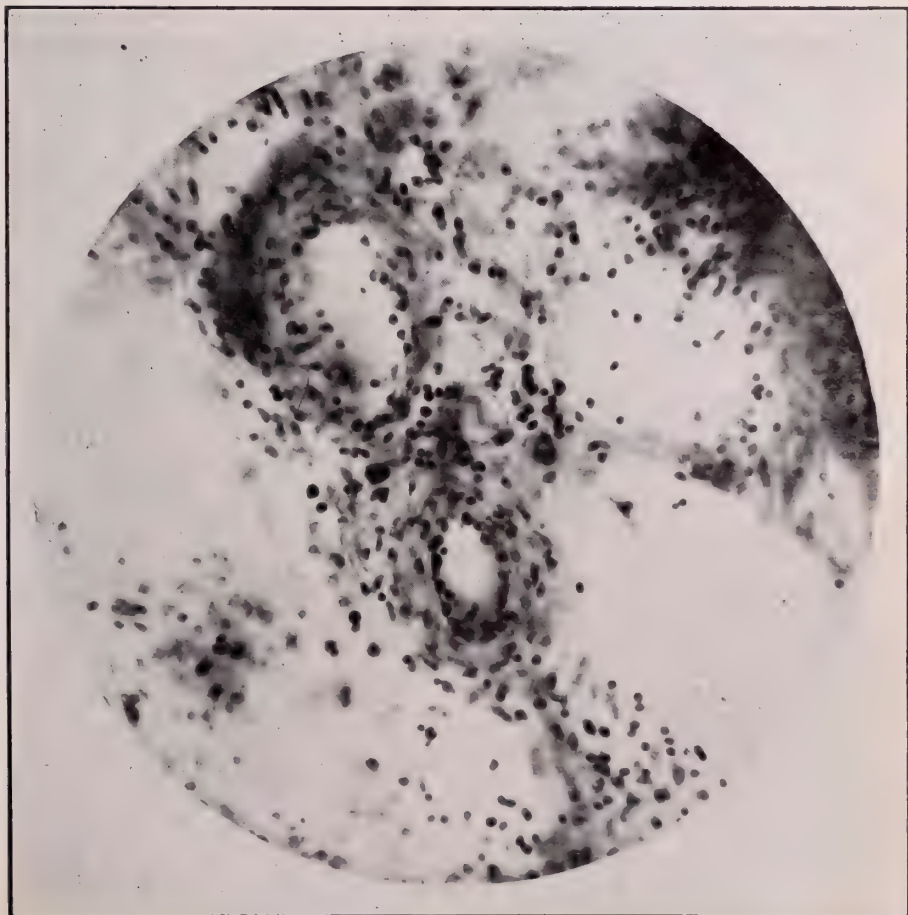
We cannot exclude a tubercular origin of the growth, altho tubercle bacilli have not been found, in spite of the most careful examinations by competent pathologists. In view of the foregoing, I believe that we are justified only in describing the case as a **granuloma of the choroid** of obscure origin. Such a case was described by Frank O. Thomas and George Coates<sup>20</sup> under the title "Peculiar Granuloma of the Retina." The case showed a large retinal growth with marked optic neuritis; the trouble followed upon an attack of influenza. The growth was examined pathologically and found to be a large granuloma coming from the retina.

CASE 2.—Charles F., aged 12, was first seen on November 16, 1917. The sight of the right eye had been lost, but no definite history could be elicited. The fundus of the right eye showed intense dilatation of the arteries and veins, both of which were exceedingly tortuous, especially in the temporal half of the retina. In the temporal periphery there was a large neoplasm, rounded, projecting far into the vitreous (its surface could be seen with +17D). It was pinkish in appearance





SECTION OF TUMOR, CASE I, UNDER LOW POWER



CASE II. SECTION OF ORGANIZED INFLAMMATORY EXUDATE UNDER HIGH POWER





and on its surface large convoluted vessels were conspicuous. The optic disc was blurred in outline and presented the picture of a moderate neuritis. There were numerous small white effusions on the nasal side of the disc, somewhat larger ones, arranged in rows, studding the entire macular region. There were also small white exudates in the lower portion of the retina. In the lower periphery one large blood vessel was converted entirely into a white branching streak, accompanied by the white spots just described. In the lower outer field there was a small area of flat detachment.

Transillumination, contrary to my expectation, gave no shadow. The ophthalmoscopic picture was very difficult to interpret. The growth had all the appearance of a choroidal sarcoma. But the presence of the large masses of blood vessels on its surface, and especially the exceedingly high degree of dilatation of the retinal blood vessels (which were increased in breadth to 4 and 5 times the caliber of the vessels in the fellow eye) were very anomalous.

A careful clinical examination at the hands of Dr. Louis P. Hamburger showed that the boy was otherwise quite healthy. Dr. Sydney R. Miller examined the blood and urine with negative results; a Wasserman test and a von Pirquet reaction were both likewise negatives. These results excluded a luetic affection or a solitary tubercle. The condition of marked dilatation of the bloodvessels and the presence of evident disease in the retinal bloodvessels together with the scattered white exudates in the retina, suggested the possibility that the case belonged to the class first described by Coates under the title "Forms of Retinal Disease with Massive Exudation." In cases of this kind, which I described in a paper read before the Am. Oph. Soc. in 1914, I was much impressed by the prominent tumor-like masses which they at times present, as well as by the marked disease of the retinal vessels.

The patient was seen by several col-

leagues who concurred in the probably malignant nature of the neoplasm, and who agreed in the advice that the eye should be enucleated. This operation was performed December 6th, at the Woman's Hospital. The eye-ball was placed in the hands of Dr. Standish McCleary for pathologic investigation. His report is as follows

"After formaldehyde fixation a section through the equator of the eye shows a mass  $0.9\text{cm} \times 0.6\text{cm}$  projecting into the posterior chamber.

"Under low power magnification this mass is very vascular, the vessels both in size and number are excessive. A recent hemorrhage covers the surface of the mass at one point. There is also diffuse hemorrhage.

"Higher magnification shows that the vessels are in various stages of development, some forming and others fully developed. Several of the smaller ones contain hyaline thrombi. The tissue is very cellular and consists chiefly of what is termed "round cell exudate," comprising lymphocytes, a few plasma cells, polynuclear leucocytes and large mononuclear cells. Scattered among this cell complex are numerous fibroblasts and collagen fibrils. The organization of the exudate is more advanced in other places, showing strands of fibrous tissue. Between the pigmented epithelial layer of the retina and the choroid for a distance equal to one-half the length of the mass, there is a serous exudate containing a few leucocytes, lymphocytes and pigmented cells.

"There is nothing in any part of the mass to suggest a neoplasm and the picture is typically that of an inflammatory exudate undergoing organization."

Dr. McCleary regarded the case as one of "Retinitis with Massive Exudation."

The two cases described in this paper indicate the difficulty, or even the impossibility, of making a definite diagnosis in some cases of neoplasm of the fundus, solely on the ophthalmoscopic appearances.

## BIBLIOGRAPHY.

1. Kerschbaumer. Das Sarkom des Auges, Wiesbaden, 1900.
2. Baas. Graefe's Archiv für Ophth. 1898, v. 45, pt. 3.
3. Parsons. Pathology of the Eye. London, 1905, v. 2, p. 462.
4. Groenouw. Graefe-Saemisch Handb. 2nd Ed. v. XI, p. 778.
- \*5. Haas. Zuzammenstellung der Fälle von primären Erkrankungen des Uvealtrakts Dissertation, 1880.
6. Lawson. Tr. Ophth. Soc. United Kingdom, v. 3, p. 117.
7. Badal. Arch. d'Opht. 1886, 104, 301.
8. Alexander. Syphilis und Auge. Wiesbaden, 1889, p. 77.
9. Lewin. Arch. f. Derm. and Syph. 1891, p. 1000.
10. Hirschberg. Lewin Festschrift, 1895.
11. Gutmann. Münch. med. Woch. 1902, p. 2098.
12. Alt. Ophth. Rec. 1908, p. 300.
13. Hanssen. Klin. M. f. Augenh. v. 56, p. 66.
14. Spalding. Trans. Amer. Ophthalmol. Soc. v. 10, p. 141.
15. Natanson. Klin. M. f. Augenh. 1910, v. 48, 1, p. 113.
16. Salzmann. Klin. M. f. Augenh. v. 49, 2, p. 113.
17. Groenouw. Graefe-Saemisch Handb. v. 11, pt. 1, p. 701.
18. Parsons. Pathology of the Eye, vol. 2, p. 466.
19. Lubarsch-Ostertag. 1910-13, Supplementary volume.
20. Thomas and Coats. Tr. Ophth. Soc. United Kingdom, v. 31, p. 149.
21. Friedenwald. Amer. Ophth. Soc. 1914, v. 13, p. 819.

## REPORT OF TWO ORBITAL TUMORS.

A. EDWARD DAVIS, M. D.

NEW YORK.

These cases, one of endothelioma of orbit and frontal bone, and one of myxoglioma of optic nerve and orbit, were reported to the American Ophthalmological Society, July 10, 1918.

CASE 1.—Endothelioma Affecting the Orbit and Frontal Bone.—Mr. C. C., aged nineteen years. Family history negative; is robust—in fact, a football player. Consulted me December 21, 1917, because of swelling of the lids and prominence of the right eye, the swelling extending from the eyebrow to the hair, circular in shape, of an elevation one-half inch, and of bony hardness; no pain; temperature and pulse normal. Patient thinks the swelling on the right side of the forehead may have resulted from injury while playing football, although the skin surface was never broken. V. R. E.=20/30; L. E.=20/20, not improved; J1, 6 to 18 inches each. Slight swelling of nerve-head in right, with the veins slightly enlarged; fundus normal otherwise. Tn. Blind spot normal in size, also the fields and pupils. Slight restriction in movement of the eye upward and outward, and double vision obtained when he looks far up and outward.

January 4, 1916: Thru an incision

one and one-half inches long, just below the upper rim of the orbit, the lacrimal gland and part of the roof of the orbit were removed. Pathologic examination of the specimen showed it to be an endothelioma. One week later the roof of the orbit and 1½ inches of the frontal bone to the hair on the forehead, together with the meninges, extending itself into the brain tissue, were removed. The patient made a good recovery, so far without return of the trouble. After the wound had firmly healed the patient has been and is now under X-ray treatment at week intervals.

Present condition: The patient is in perfect health and at his work as a clerk, and feels no ill effects from his operations. There is no sign of brain hernia, the right side of the forehead being on a level with but not protruding beyond the left, the symmetry of the two sides being remarkable. The advisability of a bone-graft has been considered, but, as the opening in the



skull is so large, it has been questioned if so large a space could be successfully bridged over by this method of procedure; so far only a protective cap has been used. There is slight ptosis present, and all the external muscles of the eye are inactive save the obliques, both of which function. There is a divergence of 20 degrees. The pupil is normal in size and reaction, and the accommodation the same as in the sound eye. Vision in each eye is same as before operation; simple binocular vision is absent. The fields are normal. No attempt has as yet been made to remedy the ptosis or place the eye in a straight position, and will not until the X-ray treatment is completed, and a return of the growth considered unlikely.

As to the pathogenesis of endotheliomata, Parsons states that "The exact nature of endotheliomata and their exact position amongst the sarcomata have not been settled." He himself classifies them as fibrosarcomata. The prognosis in such cases is rather favorable, as they are not nearly so malignant as the round-cell type of sarcoma. (Pathology of the Eye, vol. ii, p. 707.)

CASE 2.—Myxoglioma of the Optic Nerve and Orbit, Intradural, being the recurrence of a Spindle-celled Sarcoma (?), Intradural, removed seven years previously by the Krönlein Method.—The previous history of this patient has been kindly furnished to me by Dr. Julius Wolf, of this city, and is herewith given:

"November 20, 1910: R. D., aged eight years, no history of previous illness; the third of healthy children. Three weeks ago the left eye began to look strange to the parents and teacher, and since then the eye has been steadily growing worse. At present it shows a well-marked exophthalmos directly forward; yesterday there was no convergence; today the left eye is markedly convergent, the corneal margin being behind the caruncle. The pupils react normally. The outward movement of the eye extends to within 2 mm. of the external canthus. The ophthalmoscope shows a marked choked disc in the left eye. Both eyes are hyper-

opic about 4 D. with some astigmatism. The lacrimal gland cannot be felt. There is a decided feeling of resiliency of the left eyeball when pushed into the orbit.

"November 21st: The internal strabismus has disappeared; the exophthalmos has not changed any.

"November 23d: Convergence present again; V. L. E. = 15/50, disc still choked. X-ray by Dr. Caldwell shows blurring in the ethmoid reaching to the orbit. Diagnosis: tumor of the orbit. Operated by the Krönlein method, and removed part of the optic nerve, which had a spindle-shaped tumor inside the optic nerve sheath, about one inch long by three-fourths in thickness at center. On examination of the tumor a diagnosis of spindle-celled sarcoma was made."

This girl first came under my care at the Post-Graduate Hospital six months after the operation by Dr. Wolf. The condition found was convergence of the left eye 30 degrees, due to section of the external rectus muscle; V. = O; postneuritic atrophy of the optic nerve; pupil normal in size and reacted consensually. There was a discharging sinus at the lower end of the Krönlein incision, which had healed except at this point; patient was in good health, and there was no sign of metastases.

The fistulous opening was enlarged, some dead bone removed, followed by immediate healing. The patient remained well until the spring of 1918, having been under observation by myself every few months all this time—about seven years. During March of this year the patient noticed that the eye was again becoming prominent. The eye is now displaced  $4\frac{1}{2}$  mm. forward and slightly inward. No pain is complained of. The ophthalmoscope shows a white optic disc, but no inflammatory symptoms in the fundus. Pupil normal in size and to consensual reaction. X-ray shows the apex of the orbit up to the eyeball filled with a growth. Because of the recurrence, a complete exenteration of the orbit was advised.

On June 13th, under ether narcosis, Dr. Hubbard, my chief of clinic, performed a complete exenteration, first enucleating the eyeball, then removing the entire orbital contents, including periosteum. The optic nerve could be seen both at the anterior portion and the posterior portion of the tumor, so it is evident that not all the optic nerve was removed at the first operation; in fact, the retinal circulation was maintained in the eye up until the time of the second operation.

The pathologic examination of the tumor is as follows:

**MACROSCOPIC.**—The eyeball has increased tension. The pupil measures 2 mm. The iris is white and thickened. On section the lens is much flattened and has an opaque, greenish-yellow nucleus. The vitreous is fairly normal. The retina is transparent, and the choroid shows loss of pigment, especially at the equator. There seems to be linear radial thickening near the papilla. The capsule of Tenon is hemorrhagic, and the optic nerve is enlarged to 2.5 cm. in diameter for a distance of 4 cm. behind the bulb. This tumor is resilient, and its cut surface seems to show a hypertrophy of the optic nerve, somewhat soft and degenerating. The growth is surrounded by muscles, gland, and fat.

**MICROSCOPIC.**—Cross-section of tumor of optic nerve reveals a picture entirely of neuroglia cells and fibrils. All nerve-fiber elements have disappeared, and their place is filled with myxoid material thru which the neuroglia tissue is intertwined with scant remnants of the old connective-tissue septæ. Irregular hyalin bodies are frequent, and an occasional amyloid concretion. The sheath is not remarkable.

**DIAGNOSIS.**—Myxoglioma.

Parsons states that the term "glioma" has been used loosely for any connective growth occurring in nervous structures, and cannot be considered authentic unless the growth is proved to consist essentially of a neuroglial hyperplasia by the successful application of specific neuroglial stains.

[Parsons: Pathology of the eye, p. 699.]

I may say that, besides Dr. Meeker, of the Post-Graduate Laboratory, Professor Ewen, of Cornell, has examined some of the sections of this tumor, and has pronounced it myxoglioma. The variety and rarity of such intradural growth certainly make it worth while for report. That a glioma should succeed a sarcoma, if the first growth was a sarcoma, is also of interest.

## TUMOR OF THE ORBIT, WITH EXTENSION TO FRONTAL AND TEMPORAL REGIONS, TREATED BY X-RAYS.

WILLIAM M. SWEET, M. D.

PHILADELPHIA.

This case, showing the beneficial effects of Roentgen ray treatment, was reported to the American Ophthalmological Society, July 10, 1918.

The following history of a case of orbital tumor does not differ in its essential features from the usual type of these growths. The case is reported as an evidence of the value of the Roentgen rays in controlling the disease for several years, as shown by the bone regeneration that followed the treatment:

S. H., aged twenty-six years, first

noticed swelling of the eyelids of the right side two years prior to the date of examination, May, 1908. In a few months the sight of the right eye began to fail, and there was slight protrusion of the globe. There was no pain, and the symptoms remained unchanged until six months ago, since which time the prominence of the eye increased. Well-developed, robust,

healthy individual, with normal urinary and blood tests, and with no family history of malignant disease. No history of injury. Right eyeball turned down and slightly outward, and protruding 8 mm. beyond the level of the left eye. Outward rotation impaired, but fair rotation in other directions. Palpation showed a hardened mass above eyeball, extending from near the inner canthus to slightly beyond center of orbital margin. Pressure failed to relieve the exophthalmus. The right pupil was 4.5 mm., reacted sluggishly, the left 3.5 mm., reacted freely. The left eye was normal in all respects. The optic disc of the right eye was pale, the veins full and tortuous, particularly the smaller twigs, and the arteries reduced in caliber. Visual fields contracted on temporal side.

Following a request of the patient to endeavor to save the eyeball, an incision was made thru the brow, the orbital fascia separated, and the finger passed into the orbit. A dense, hard mass was found attached to the upper and inner orbital wall, not connected to the eyeball or optic nerve, but extending some distance beyond the globe. In order to remove the mass the eyeball was enucleated, an incision made thru the external canthus, and complete extirpation of the orbital tissues made.

After separating the periosteum with the tumor it was found that the disease had attacked the bone in the upper nasal portion of the orbit, and there was an opening large enough to admit the finger thru the bone and

dura. The orbit was packed, and healing was uneventful. X-ray treatment of the orbit was given by Dr. W. F. Manges, of Philadelphia, and continued later by Dr. George C. Johnston, of Pittsburgh, in which latter city the patient was in business.

Three years after the operation swelling was noticed of the frontal bone, particularly in the outer portion. The X-ray treatment was directed to this region, and later also to the temporal bone, which showed enlargement. These measures held the disease in check, and enabled the man to continue his work. A set of stereoscopic X-ray plates showed the right frontal sinus completely occluded by the disease, with extensive involvement of the frontal and temporal bones. These plates indicated, as reported by Dr. Manges, that healing was in progress in the frontal region, the process being one of bone regeneration, but in the temporal region there was not the same evidence of bone reproduction, indicating activity of the disease in this situation. The X-ray treatments were given every four weeks, the full therapeutic dose being administered for five minutes in different directions to reach the diseased areas.

Late in 1916 the man died. Until three days preceding death he was comparatively comfortable. He then had intense headache, followed by delirium. No postmortem examination was permitted. The tumor was shown to be an endothelioma.

## TRANSIENT LEFT HOMONYMOUS HEMIANOPSIA.

HENRY H. TYSON, M. D., F. A. C. S.

NEW YORK.

Report of a case probably toxic and of angioneurotic origin, recovering from first attack with a recurrence, leaving quadrant achromatopsia.

On March 27, 1911, Mr. M. C., aged twenty-eight years, banker, was referred to me by his physician, on account of blurred vision on his left side. He gave a history of awakening on the morning of March 24 after a cham-

pagne spree, with a severe headache, located on the right side of his head, extending from the occiput to and around his right eye. The pain in his head remained until the next day, when he noticed that his vision was in-



distinct on his left side, and had remained so until the date of his examination.

For the relief of his headache he had taken, by order of his physician, acetanilid grains eight, and novaspirin grains forty, during the twenty-four hours. During the forty-eight hours preceding the loss of vision, according to his statement, he had imbibed four quarts of champagne and numerous other alcoholic beverages, viz.: silver fizzes, cocktails, etc. He had been accustomed to smoking from thirty to forty cigarettes daily. He gave an early history of occasional attacks of

tion and consensually normal. Fields of vision show incomplete left homonymous hemianopsia, with form field contracted to within eight degrees of fixation on horizontal meridian (vide chart No. 1). The color fields were contracted to fixation in similar fields as per chart No. 2. Eye backgrounds normal, except that the retinal veins were a trifle darker than normal.

Pulse 76. Blood pressure 138. Blood examination by Dr. Sondern R. B. C. 5,030,000; W. B. C., 9,000; hemoglobin, 68 per cent. Differential count, relative lymphocytosis. Urinalysis, Sp. gr. 1015, acidosis, low urea, no albumin,

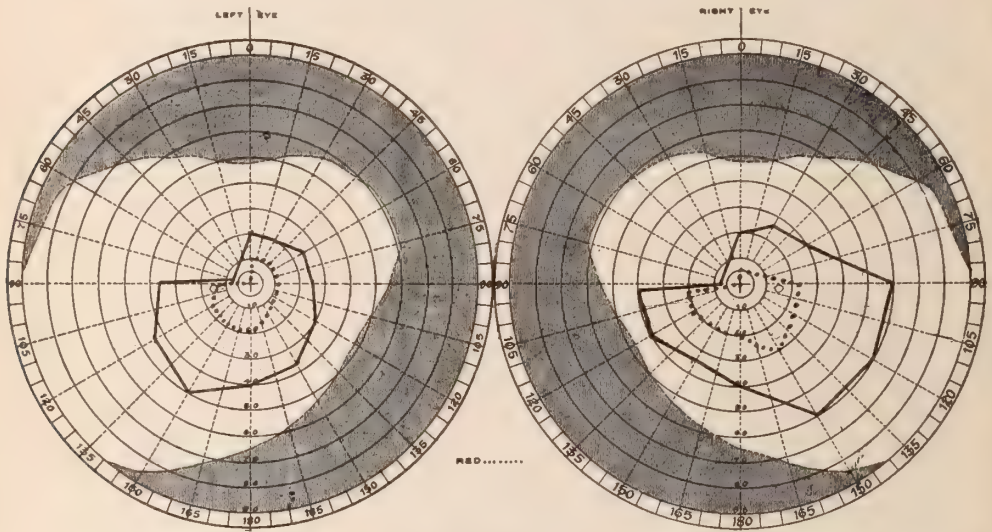


Fig. 1. Chart of visual field during transient hemianopsia.

migraine, commencing when he was eight years of age; and at times numbness of his hands would accompany them. They ceased at age of twenty-three. During 1903 Dr. R. F. Weir removed a tumor from his thigh, and the pathologist pronounced it a traumatic sarcoma. Syphilis negative—had gonorrhea during 1905. Tuberculosis, teeth and sinuses negative.

Examination of eyes—March 27, 1911. Vision, R. 20/15, L. 20/15, with correction plus 0.25—plus 0.25 cyl. 90° equals 20/10 both. Muscles, orthophoria. Tension normal. Sensibility of corneas normal. Pupils 2½ mm. each. Reaction to light, accommoda-

tion and consensually normal. Fields of vision show incomplete left homonymous hemianopsia, with form field contracted to within eight degrees of fixation on horizontal meridian (vide chart No. 1). The color fields were contracted to fixation in similar fields as per chart No. 2. Eye backgrounds normal, except that the retinal veins were a trifle darker than normal.

Eliminatives and light diet, with avoidance of alcohol and tobacco, were ordered, and nine days later, color and form fields were quite normal. On December 7, 1911, he called again for examination. Vision, R. 20/20, L. 20/20. He stated that ten days previously he had a "bilious headache" after another spree, and that his vision was again blurred; but had not cleared up like the attack in March. He had been drinking large quantities of champagne and other alcoholic beverages during the past month, and had also been

smoking his usual number of cigarettes, about forty daily. Examination of visual fields showed left homonymous superior quadrant anopsia, incomplete; the apex of the angle extending to within five degrees of fixation for form, while that for colors was contracted to fixation. The right fields were contracted about twenty-five degrees from fixation. Eye backgrounds, disks slight pallor with edema, retinal veins dilated and tortuous, arteries slightly contracted. On December 20 his form fields had widened to within ten degrees of normal, while his color fields remained contracted in left su-

perior quadrants, along with a constitutional migrainous dyscrasia in originating the attacks.

Among others Peter<sup>2</sup> reported a case of left homonymous hemianopsia associated with migraine, and Posey<sup>3</sup> also reported a case with left fields somewhat similar to mine, excepting that it was right homonymous hemianopsia, and was permanent. As to the localization of the site of the lesion in these cases we are indebted to Beevor<sup>4</sup> and Collins for their careful study and report of their case of permanent left superior quadrant anopsia, with clinical, microscopic and autopsy findings, the

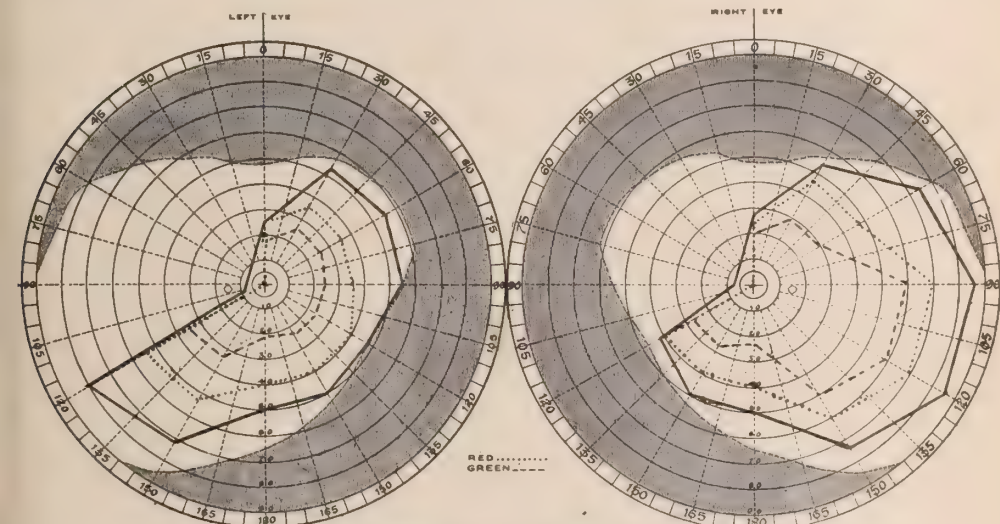


Fig. 2. Chart showing boundaries of color fields during transient hemianopsia.

perior quadrants to about fixation, constituting a left homonymous superior quadrant achromatopsia.

Transient hemianopsia may be found associated with cerebral lues,<sup>1</sup> uremia, lead poisoning, general paralysis, chronic nicotin poisoning and in ocular migraine. After careful consideration of the case just reported, I am of the opinion that it belongs in the class of ocular migraines, and that the previous history of a neoplasm, or the drugs prescribed by his physician for his headache had no influence as causative factors in producing the hemianopsia. I think that the alcohol and the nicotin, especially the former, were

visual fields in which were very similar to those in case under consideration. "They found at autopsy an occlusive lesion of the right posterior calcarine artery which caused destruction of the inferior third of the cuneus, including all the cortex above and below the calcarine fissure, with the exception of a small point anteriorly. Careful microscopic study showed that the lesion was limited entirely to the cortex. They concluded that the lower third including the upper and lower lips of the calcarine fissure, represented the upper visual quadrants, while the upper two-thirds of the cuneus represented the inferior quadrants." In or-

der to account for the production of the transient anopsias in the left superior quadrants in migraine, we would be obliged to postulate a prolonged spasm of the right posterior calcarine artery with a consequent ischemia and possible edema, (angioneurotic edema), with subsequent disappearance of same. The extent of organic changes, if any follow, would depend upon the toxicity of the exciting cause, and the length of time the tissues were de-

prived of their nutrition on account of the disturbed circulation.

The interesting features of the case are: 1. The transitory nature of the first attack which persisted nine days with restoration of visual fields, and the recurrence eight months later with recovery in form field but permanent left homonymous superior quadrant achromatopsia remaining.

2. The fact that alcohol and tobacco were probably the exciting cause of the cerebral angioneurosis.

#### BIBLIOGRAPHY.

1. Oppenheim. Lehrbuch des Nerven Krankheiten. 1913, vol. 2, p. 1274.
2. Peter. Principles and Practise of Perimetry, p. 203.
3. Posey. Journal American Medical Association, May 8, 1915.
4. Beevor and Collins. Brain, 1904, p. 153.

### ALTERATIONS IN THE VISUAL FIELDS ASSOCIATED WITH PELLAGRA.

F. PHINIZY CALHOUN, M. D.

ATLANTA, GA.

A summary of observations and reports of cases, presented to the Section on Ophthalmology of the American Medical Association, June 14, 1918.

For nearly two centuries that disease which is commonly called pellagra has attracted the attention of the medical profession of southern Europe, but only within the last decade, when its prevalence in America assumed alarming proportions and it began spreading with startling rapidity, have we given it serious thought. Today, in the South especially, where the disease is widespread, there is no malady which is receiving more attention from scientific and economic minds.

The history of the disease is attractive, and the literature of the subject is voluminous. It is therefore an easy task for one interested in the general subject to find ready references in any well equipped medical library.

I have previously recorded<sup>1</sup> certain alterations of the visual fields occurring in individuals affected with pellagra, and I wish to attach those cases, and certain excerpts from that report, to this communication in order to make it complete.

It may not be amiss in this connection that I define the disease, and briefly mention the facts regarding its etiology and symptomatology that have been given us by students of pellagra. Roberts<sup>2</sup> very tersely says that "pellagra is an endemic and epidemic disease, periodic and progressive in its course, and characterized by a series of symptoms involving chiefly the digestive, cutaneous and nervous systems." Its cause is usually regarded as unknown, yet many theories have been advanced, none of which have stood the test of time. The two that have been most prominent are (1) the intoxication theory, or that pellagra is caused from spoiled maize, and (2) the infectious theory, or that pellagra is an infectious disease caused by the presence of a parasite in the human body which is probably conveyed by an insect of some kind. The former has always been the most generally accepted, until in 1915, Goldberger, after considering the striking relation of pel-



lagra to poverty, conducted an experimental study on men previously free from pellagra at the farm of the Mississippi State Penitentiary. By an offer of pardon from the governor of the state, eleven volunteers were obtained, and a like number of other convicts were used as controls. Those used in the experiment were fed on special diet (chiefly carbohydrates) consisting of flour, meal, grits, rice, sugar, syrup, potatoes (sweet), fat pork, collards, cabbage, turnip greens and coffee; the controls were given the usual prison food which included animal proteins and legumes. All of the men performed the same character of work, but the two squads were separated. After about six months, at least six of the eleven volunteers developed symptoms of pellagra, including a typical dermatitis; loss of weight and strength, and mild nervous symptoms appeared early, yet gastro-intestinal signs were slight. Goldberger concluded from this study that pellagra had been brought about by a one-sided diet, and he seemed justified in concluding that pellagra was of dietary origin.

The symptoms of the disease are likewise varied and uncertain, but there are certain signs that are usually sought for in arriving at a diagnosis, such as catarrhal disturbances of the alimentary tract varying in extent from the mouth to the anus, the nervous and mental phenomena, and chiefly the cutaneous symptoms—a dermatitis. Ocular changes occurring in pellagra have long been noted. Pathologic changes in the nerve head have been frequently noted by Rampoldi,<sup>4</sup> Whaley,<sup>5</sup> Ottolenghi,<sup>6</sup> Giuta<sup>7</sup> and others, while Procopui<sup>8</sup> calls attention to the frequency of amblyopia in pellagrins. There have been noted also circulatory disturbances in the retinal vessels, attributable to the toxins derived from the disease. In addition, juvenile cataracts are frequently mentioned (Tucker,<sup>9</sup> Procopui,<sup>8</sup> Fabricus,<sup>6</sup> Whaley<sup>5</sup> and Marie<sup>10</sup>) and are considered quite prevalent.

Calderini<sup>11</sup> reported that 48 per cent of men and 72 per cent of women complained of disturbance of vision, such

as amblyopia or diplopia. Ottolenghi noted a papillitis, and in one case the visual field was more restricted in the left eye than the right. In another case he noted "a grave atrophy of the disc." Bietti<sup>12</sup> likewise reported an atrophy of the disc, and he regarded an amblyopia ranging from 20/30 to 20/70 as very common. Visual fields were normal in fifty-five patients examined. Microscopic sections of the nerve and retina, which were stained by the method of Nissl, Marchi and Pal, were negative.

The more recent clinical studies of pellagra made by Ridlon<sup>13</sup> are of interest in this connection. His report is based on the observation of fifty-eight patients suffering from pellagra, who were treated in the United States Marine Hospital, Savannah, Ga. Only those patients were admitted who were found free of tuberculosis, syphilis, or any affection of the heart, kidneys or lungs. In summarizing the symptoms, he states that dimness of vision was present in 34 per cent of the cases. These patients often described this as "the presence of a skim or haziness before the eyes." Also dimness of vision was the first symptom making its appearance in three cases. Unfortunately, no report is made of the ocular findings or visual fields, if any were made, in these cases.

Harris<sup>14</sup> likewise mentions disturbances of vision in a fatal case of pellagra.

I have made careful fundus examinations in about fifty cases, the majority of these patients not being active pellagrins. The only picture in the very active or seriously ill patients that was divergent from the normal fundus was the decided pallor to the optic discs. Only once did I notice the extremely dilated pupil, so frequently recorded by other observers.

My attention was first directed to an alteration in the visual field with a scotoma in Case 1. Other investigations followed which now lead me to believe that a contraction for form and color takes place in the majority of the cases of pellagra, and that in a relatively large proportion of cases there is

a relative or an absolute central scotoma for colors.

I was not aware that alterations in the visual fields of pellagrins had before been recorded, although Whaley must have attempted such a study, since he writes that "all pellagrins are unresponsive and no field examination could be made." I likewise found, as has been recorded, that Calderini mentioned a contracted field in one case, and in fifty-five patients examined by Bietti all fields were normal. It is proper to mention in this connection that in those cases which showed a scotoma a thoro physical examination and blood Wassermann was made, and

perintendent and medical staff of the Georgia State Sanitarium for the insane at Milledgeville, I visited the institution, where, out of the several hundred of pellagrous inmates, about fifty were selected for the examination. Yet out of that number I was able to examine satisfactorily only about fifteen patients on account of the lack of co-operation and the deranged mental condition of the patients. Later, thru the hearty coöperation of several of my local confrères, I satisfactorily examined many of their private patients. In many instances it was necessary to repeat the examination or even train the patient. I used the ordinary perim-

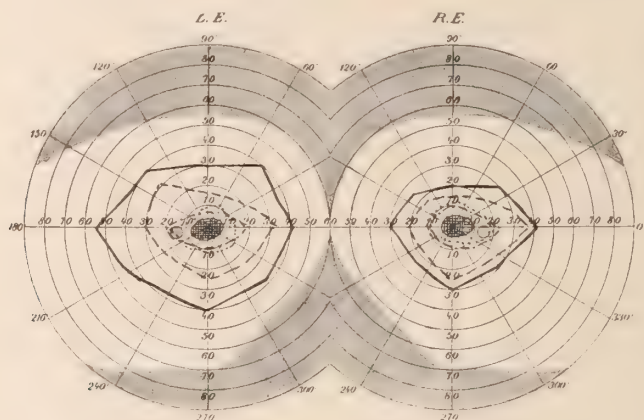


Fig 1. (Case 1, Oct. 23, 1915).—A contraction of the form and color fields, with a slight interlacing of the greens and reds. In the right field there is an absolute scotoma for red, and a relative scotoma for green. In the left field there is an absolute scotoma for red and green, and a relative scotoma for blue.

all other conditions that would have been likely to produce this picture were eliminated. When there were contributory causes associated with pellagra, such as the habitual use of tobacco, alcohol or morphin, these cases were grouped, as the diagnosis might be properly questioned.

This investigation was first begun in the medical ward of Grady Hospital, and in the out-patient department of Emory University School of Medicine, where there are at all times many cases of active and quiet pellagra. After a few attempts in taking the fields of vision of these patients, especially among the negroes, I abandoned the task as hopeless. Thru the kindness of the su-

eter of 33 cm. radius and Schweigger's 1 centimeter test objects in taking the fields and Peter's hand campimeter in mapping out the central areas.

#### REPORT OF CASES.

CASE 1.—*History*.—Mrs. J. B. M., white, aged 46, housewife, consulted me April 8, 1915, on account of defective vision of two months' duration. There was nothing of importance in the family history. She had enjoyed good health, except for joint pains which she termed "rheumatism." She complained of indigestion and constipation. She had been married twenty-one years and had had six pregnancies, of which the first three were miscarriages. She had

not menstruated for four months. She had not complained of sore mouth and tongue, but had extreme nervousness. She did not know that the skin on the dorsal surface of the hands and forearms was rough and brown. She was not addicted to the use of drugs, whiskey or tobacco. After my examination, in which I found amblyopia with central scotoma, I referred the patient to Dr. Stewart R. Roberts for a general physical examination, who reported nothing abnormal except a mild atypical pellagra. The patient being well developed and presenting none of the pellagra symptoms with which I was familiar at that time (this being my

The left field showed an absolute central scotoma for red and green and a relative scotoma for blue. The blind spots were normal.

Subsequent examinations were made which showed no relative change in the fields, except that the scotomas for all colors had become less absolute. The general health of the patient has improved, her menses have become regular, the mild dermatitis has practically disappeared and she has gained in weight, but there still remains the extreme nervousness.

**CASE 2.—History.**—Dr. R. W. B., white, aged 46, referred by Dr. J. C. Johnson for an eye examination, with

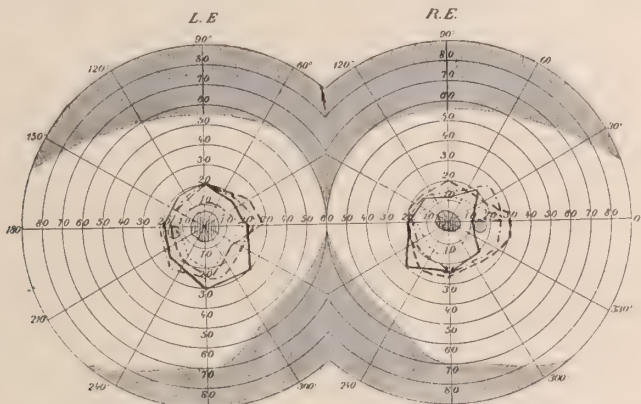


Fig. 2 (Case 2, March 1, 1916).—A field that is greatly contracted for form and color, with a marked interlacing of colors. There are central relative scotomas for red and blue.

first case), I admit that I was somewhat surprised at the diagnosis; but subsequent study of the disease and the associated eye changes convinced me of the positiveness of the diagnosis. The urine and the blood Wassermann were negative. Examination of the nose and sinuses was also negative.

**Eye Examination.**—Vision, right and left, was 20/100 unimproved. The ocular muscles were normal, the pupils round, equal and reacting to light and accommodation. The fundus showed a decided paleness of the disc in the papillomacular bundle. Tension was normal.

The fields showed a decided contraction for form and colors. In the right eye there was an absolute scotoma for red, and a relative scotoma for green.

negative family history, had been in perfect health until 1901, when he had typhoid fever, and since then his health had been bad. In 1910 he had grip; he was much "run down" in 1913. In August, 1914, he developed a severe attack of "biliousness," and could not eat for want of appetite. He lost 20 pounds in three months, which was regained, but his general condition did not improve. In October, 1915, he lost 30 pounds, and in April an eruption appeared on the hands and wrists, at which time he consulted Dr. Johnson. He had never had diarrhea or sore mouth. He did not use tobacco, and rarely took a drink of whiskey. He denied the habitual use of any drug. A general physical and laboratory examination was made by Dr. Johnson,



who reported nothing definite, except a well defined case of pellagra. The nose and sinuses were negative.

*Eye Examination.*—Vision, right and left, was 20/15 with correction. The pupils, muscular balance and fundus were normal. The fields showed marked contraction for form and color, with a central relative scotoma for blue and red. The blind spot was normal.

Nov. 24, 1917, there was much improvement in the general symptoms, and the patient had gained in weight. The fields for form, while still contracted, showed a decided improvement. There was a marked interlacing

dilated, but contracted to a strong light. The fundus was normal, except for marked physiologic cupping in the right eye. Tension was normal.

The fields showed marked contraction for form and colors, with a relative scotoma for red and green. From this examination I questioned the patient closely and soon learned that I could not obtain an accurate history from her. But it was definitely determined that she had lost considerable weight within the last few months, and that her present nervous and mental state had alarmed the family. From a picture of the visual fields, pellagra was

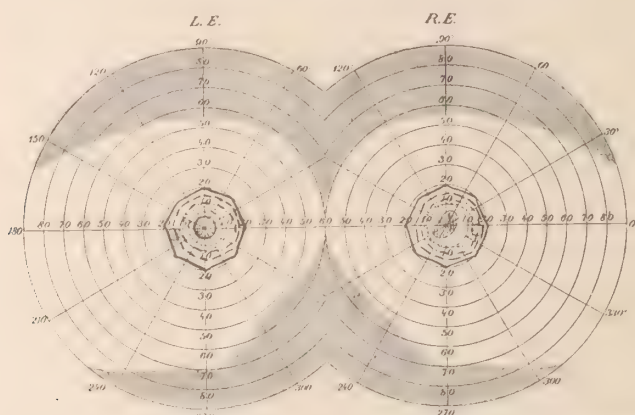


Fig. 3 (Case 3, June 22, 1916).—A marked contraction for form and colors, with relative scotomas for red and blue.

of colors, and in the right eye there was a relative scotoma for colors.

The next case was the most brilliant one of the series, for we were able to suspect the diagnosis of pellagra from the picture of the visual field.

*CASE 3.—History.*—Mrs. S. C. A., white, aged 26, housewife, of Heflin, Ala., seen June 20, 1916, complained of abdominal pains, a vaginal secretion, backache, headache, loss of weight and general nervousness, and was referred to Dr. W. S. Elkin for a pelvic operation. The examination did not reveal any abnormalities or changes which required surgery, but as the patient complained of headache and pains in the eyes I was asked to examine her.

*Eye Examination.*—Vision, right and left, was 20/15. The muscular balance was normal; the pupils were widely

considered as a cause; and examining her hands and forearms, I found a roughened and bronzed condition of the skin. Thoro physical examinations were made by two competent internists; one unhesitatingly made the diagnosis of pellagra, and the other would not positively commit himself without knowing the Wassermann reaction, which could not be obtained, although he considered pellagra the most likely diagnosis.

*CASE 4.—History.*—Mrs. S. A. W., white, aged 38, had had attacks of pellagra for about twelve years. The symptoms were typical of the disease, such as sore tongue and mouth, diarrhea, nervousness and skin manifestations. There had never been any mental derangement. At the time of my

examination her condition was very satisfactory.

*Eye Examination.*—Vision, right, was  $+1.50$  S = 20/20, left  $+2.00$  S = 20/30. The pupils were active and

for study, who gave the history, had the first attack of pellagra in 1914, and the main symptoms were a dermatitis on the hands, a stomatitis, and constipation. At that time there were di-

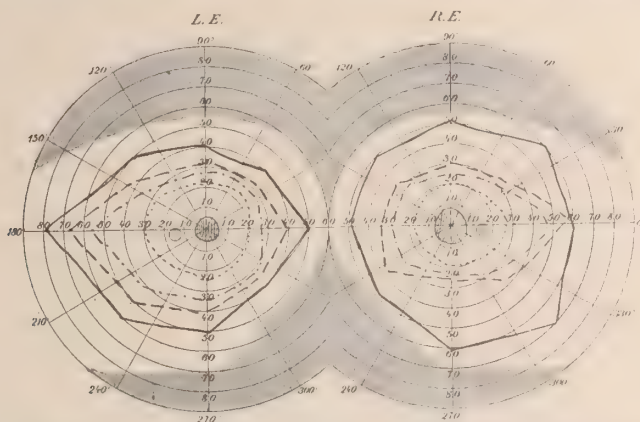


Fig. 4 (Case 4, July 25, 1916).—First examination: A fair equality between form and color fields; relative scotomas for green and red.

normal. The fundus was normal. The fields were within the normal limits for form, but the colors were somewhat reduced. In each eye there was a relative central scotoma for green and red. The nose and the sinuses were normal.

April 12, 1917, the patient claimed that she was well of pellagra. The

gestive symptoms, such as hyperacidity. In 1915 there was a recurrence of the same symptoms, but in 1916 there were no manifestations, and the general health of the patient had improved. In the summer of 1915, sight became very bad, and she could not recognize acquaintances across the street. It gradually improved. She was not ad-

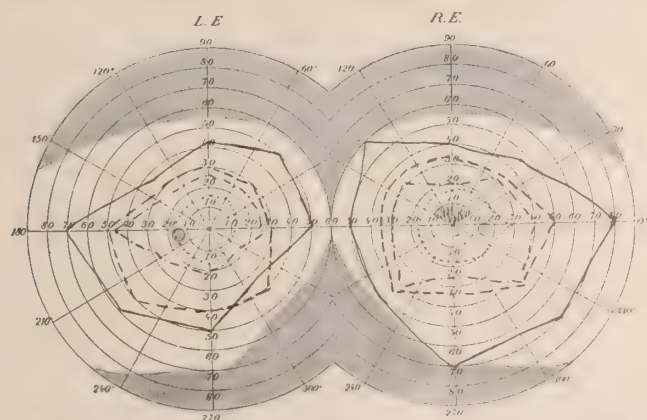


Fig. 5 (Case 4, April 12, 1917).—One year later: Fields for form somewhat irregular, with an interlacing of colors; a relative paracentral scotoma for colors in the right eye.

fields, however, showed more irregularities, and there was a relative paracentral scotoma in the right eye.

**CASE 5.**—*History.*—Mrs. M. O'D., white, aged 35, referred by Dr. Mizell

dicted to the use of drugs, alcohol or tobacco. A general physical and laboratory examination was negative. The nose and sinuses were negative.

*Eye Examination.*—Vision, right and

left, was 20/100 unimproved. The pupils were round and the reflexes normal. The fundus was negative except for a decided pallor of the discs in the temporal half.

chronic toxic retrobulbar neuritis. The diagnosis of chronic retrobulbar neuritis caused from pellagra may, therefore, be properly questioned.

CASE 6.—*History*.—M. C. G., white

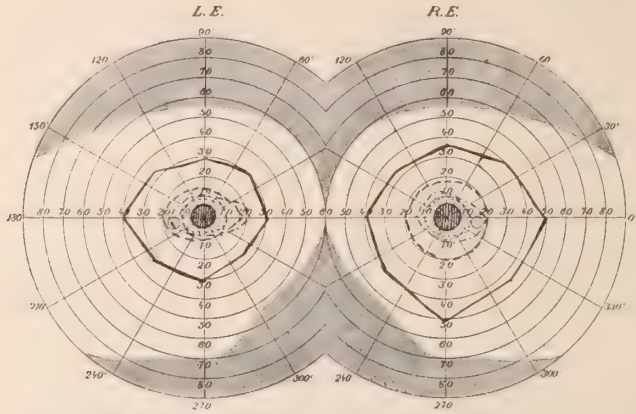


Fig. 6 (Case 5, Aug. 28, 1916).—A fairly regular contraction for form and color, with relative central scotomas for red and green.

The fields were contracted for form and color, and there was a relative central scotoma for red and green.

Nov. 16, 1917, the general symptoms were much improved, but the patient was very despondent. The right disc showed increased pallor in the papillo-macular bundle, and the visual fields were more contracted.

male, aged 54, was confined at the Piedmont Sanitarium in the service of Dr. J. E. Paullin, who requested that I examine his field and eye grounds. He complained principally of abdominal pains, bleeding hemorrhoids, general weakness and defective sight of three or four weeks' duration. The history showed that the patient had had chills

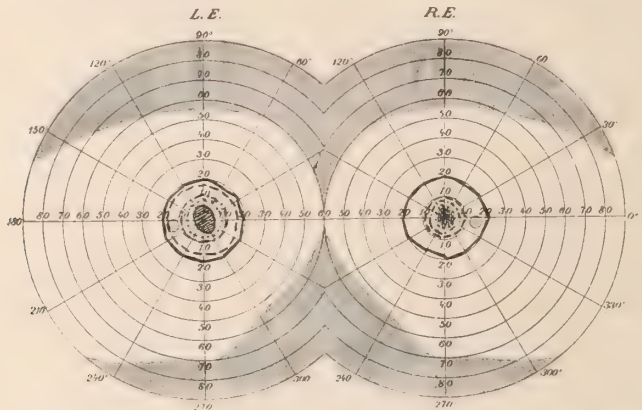


Fig. 7 (Case 5, Nov. 16, 1917).—One year later; the fields show greater contraction; the scotomas remain.

While the following two patients (6 and 7) unquestionably had pellagra and probably died from the disease, there were present additional factors, namely, tobacco, alcohol and morphin, either of which might have produced a

and fever as a child, hemorrhagic fever in 1882, dengue fever in 1884, yellow fever in 1888, and typhoid in 1911. He denied having had syphilis. He smoked five or six cigars daily, but for several weeks prior to admission to the



sanatorium he had not used tobacco. He drank 4 or 5 ounces of whiskey daily, but had never been intoxicated. The principal points in the examination were an intense pyorrhea, raw

addicted to morphin, and while in the sanatorium the drug was found on his person.

*Eye Examination.*—The eyes were examined in bed on admission to the san-

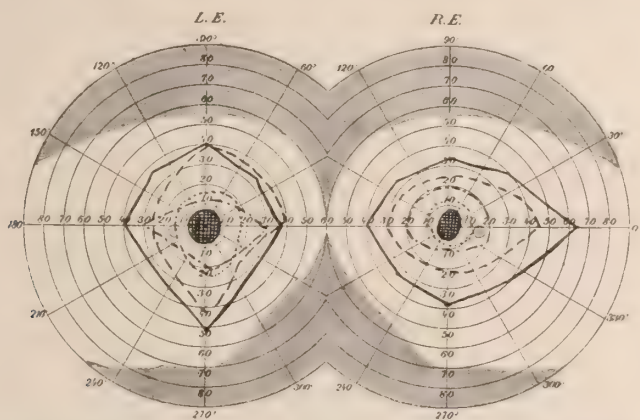


Fig. 8 (Case 6, Feb. 14, 1914).—Contraction for form and color with marked irregularity in the left eye; absolute central scotomas for colors.

tongue, red and raw buccal mucosa, and bleeding hemorrhoids. These were resected by Dr. F. W. McRae, and fifteen days later there developed a typical pellagrous erythema on the dorsal surface of both hands and about the neck. Mental symptoms then also developed, as well as a diarrhea, and the patient's

atorium in Atlanta, when he was rational. The vision could not be accurately estimated, but he could count fingers at 6 and 8 feet. The pupils were active and of normal size. The fundus showed a mild retinal arteriosclerosis. The fields were contracted for form and color with central sco-

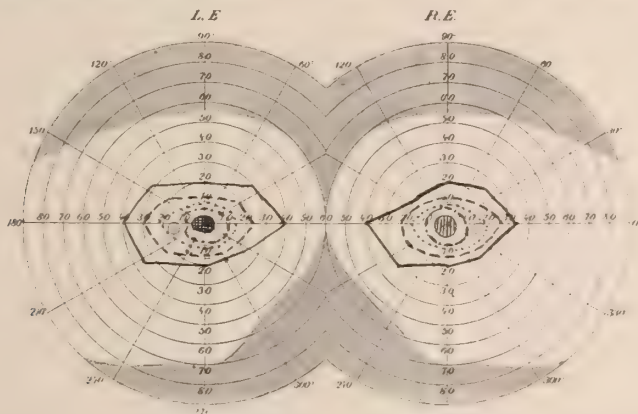


Fig. 9 (Case 7, Dec. 3, 1915).—A fairly well defined horizontal contraction for form and colors; in the right eye there is a central relative scotoma for red and green, and in the left an absolute scotoma for all colors.

condition became so desperate that he was transferred to the Georgia State Sanitarium for the insane at Milledgeville, where he died, Nov. 25, 1914. After death I learned that he had been

toma. My attention at that time was not directed to the association of eye changes (fields) with pellagra, and alcohol and tobacco were considered the cause for the chronic retrobulbar neu-

ritis. Later developments and further study of the case now lead me to believe that pellagra was probably the cause for the defective sight, as the complete withdrawal of alcohol and tobacco for about two weeks did not materially improve his vision, and his physician and nurses did not believe that any quantity of morphin had been used daily.

CASE 7.—*History*.—J. W. S., white male, aged 50, street car conductor, referred for study by Dr. George Mizel, first developed pellagra in 1913 and presented all the typical symptoms, such as red tongue, sore mouth and

scotoma for all colors. The contraction for red was most marked. Nose examination was negative.

He was urged to leave off the use of tobacco, which I am confident he did, and in one month sight had slowly improved in the left eye to 20/100. He died two months later of pellagra. After his death I was told that he had been taking daily for about two years 2 grains of morphin. As the patient did not use alcohol in conjunction with tobacco, which was withdrawn for over a month with no material improvement in vision, and as 2 grains of morphin a day is not considered a large

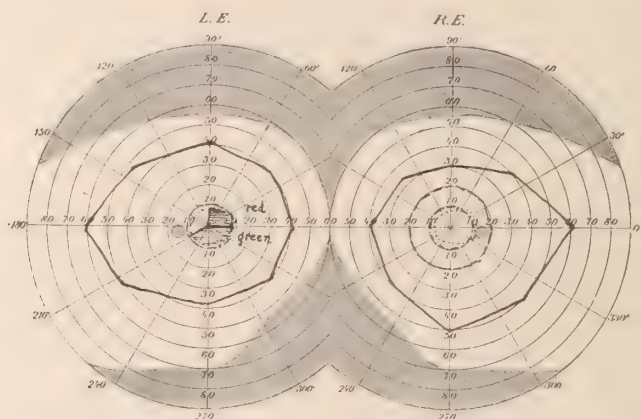


Fig. 10 (Case 8, Jan. 1, 1916).—A regular contraction for form and colors; in the left eye there is a peculiar sector-shaped relative scotoma for red and green.

rectum, digestive disturbances, and the characteristic dermatitis on the dorsal surface of both hands. Under appropriate treatment the symptoms subsided and his condition greatly improved. The patient was a pipe smoker, but had taken only one drink of whiskey in three years.

He complained of defective sight for nearly three years, and within the eight months prior to his visit, it had rapidly grown worse.

*Eye Examination*.—Vision, right, was 20/100; left, 15/200 unimproved. The fundus showed in the right eye some tortuosity of the retinal arteries, while the left was normal. The field of vision in each eye was contracted for form and color. In the right eye there was a central relative scotoma for red and green, and in the left an absolute

dose for an addict, we can reasonably assume that there were other factors that caused the scotoma.

In this series there were three other cases in which, besides a marked contraction in the field for form and color, there were either pericentral or paracentral scotomas.

CASE 8.—*History*.—Mrs. E. J., white, aged 31, an inmate of the Georgia State Sanitarium for the insane at Milledgeville, in whose case the history, examination and notes, as in all others at this institution, were most complete and thoro, had several acute attacks of pellagra before commitment in 1914, when the diagnosis of maniac-depressive insanity was made. This is one of those interesting cases in which pellagra was associated with some

psychosis. I am not sure that authorities are agreed as to their relation.

*Eye Examination.*—Vision, right and left, was 20/20. The fundus showed decided pallor of both discs, especially

the time of the examination, Jan. 1, 1916, the patient was in excellent health, of good mentality, and co-operated well in the examination.

*Eye Examination.*—Vision was: right,

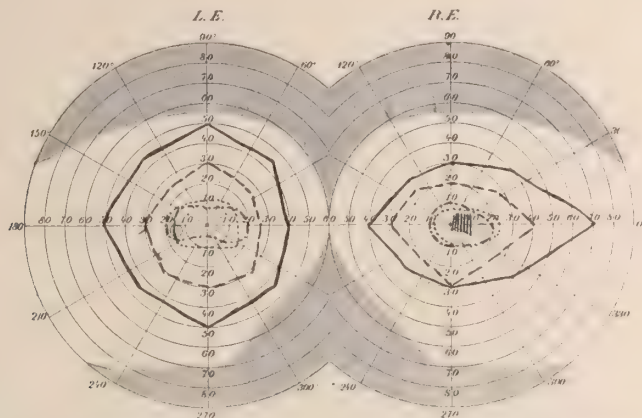


Fig. 11 (Case 9, Jan. 1, 1916).—A horizontal and vertical contraction with some interlacing of the reds and greens; there is a paracentral relative scotoma for red in the right eye.

in the papillomacular bundle. The patient was very dull and slow to answer questions, making the perimetry examination difficult. The right field showed a contraction for form and color. The left eye presented a peculiar form of sector-shaped relative scotoma for red and green.

20/30; left, 20/20. The pupils were active, and the fundus was normal. The fields were contracted for form and color. There was paracentral relative scotoma for red in the right eye.

*CASE 10.—History.*—Mrs. C. C. M., white, aged 37, residing in a suburb of Atlanta, had been an active pellagrin

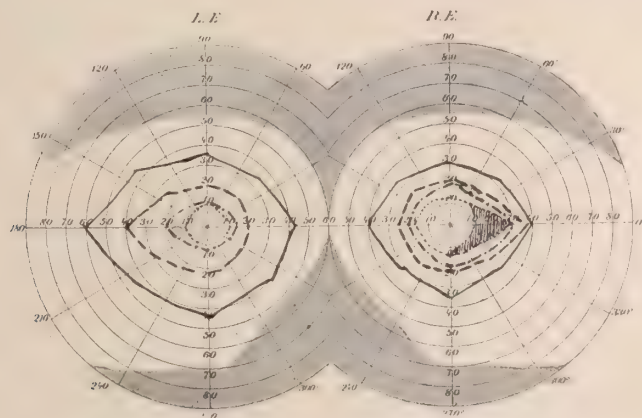


Fig. 12 (Case 10, May 1, 1916).—Moderate contraction for form and color, with a relative paracentral scotoma for green.

*CASE 9.—History.*—Mrs. M. H., white, aged 29, an inmate of the Georgia State Sanitarium, had been admitted in 1913 on account of insanity due to pellagra. The history was of no consequence. At

in 1907, with symptoms for two and one-half years. She had been seen by Dr. Mizel in 1911, when the symptoms were still apparent. Her mentality was good. Improvement had been gradual,



and at the time of the examination she was in a fair state of health.

*Eye Examination.*—Vision was: right, 20/20; left, 20/30. The left fundus showed yellowish deposits in the sub-retina between the macula and the disc.

tories or eye examinations, as they are unimportant. It is to be observed that there is a marked contraction for form and color, and often an interlacing or transposition of the colors, especially the red and green.

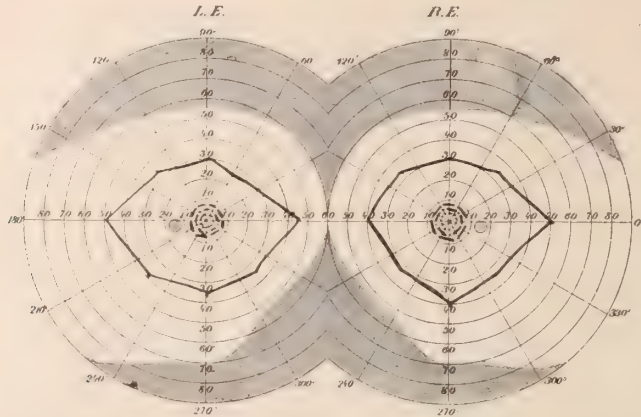


Fig. 13 (Mrs. N. C., Jan. 1, 1916).—A case in which there are irregularities for form and colors without central changes.

The fields showed moderate contraction for form and color. There was no scotoma. Four months later there was present in the right eye a relative pericentral scotoma for green, which included the blind spot. Both blind spots were slightly enlarged temporally measuring 7 by 7 mm.

At a subsequent examination of the patient Mrs. J. E. B., Nov. 9, 1917, she stated that she had recovered from pellagra, but that she was nervous and suffered from insomnia. There were no manifest lesions of pellagra that I could detect from a casual examination. The fields remained about the

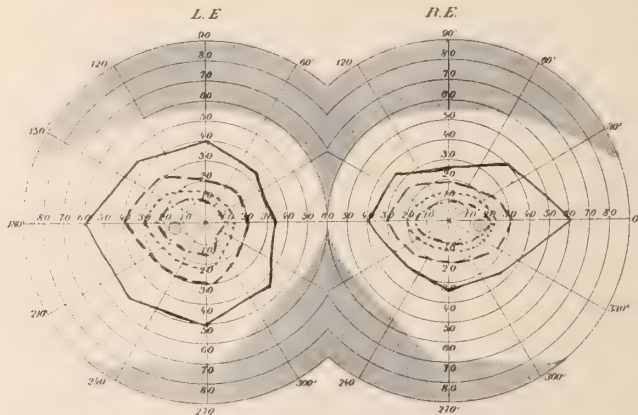


Fig. 14 (Mrs. M. W., April 26, 1915).—Irregularities for form and colors without central changes.

There was still another class of pellagrins who showed variations in the visual field without scotomas. I present herewith the fields of several of those, without the records of their his-

same, except for a marked interlacing of colors. No scotoma was present.

#### COMMENT.

In regard to the pathology of the

foregoing field alterations, thus far I have not been able to demonstrate any definite nerve change. I have had examined by competent pathologists, with negative results, the nerves and chiasm from three negro patients, and the retina of another negro patient, who died of pellagra at the Georgia State Sanitarium. However, no field or ocular examination had been previously made.

Dunlap,<sup>15</sup> in an examination of the brain of pellagrins found axonal degeneration of the cortical nerve cells, which change had been similarly noted by Spiller<sup>16</sup> in chronic alcoholism. Dunlap

monly occurs in the disease. Field changes similar to some of those here described (retrobulbar neuritis with central scotoma) occur in diabetes, in which an acidosis is frequent, and Francis has recorded cases of central blindness in which, after a most careful examination, only acetone in the urine was detected, and sight improved along with the disappearance of the acetone from the urine. So far my investigations along these lines, with the help of my colleagues, have been negative.

De Schweinitz,<sup>18</sup> in discussing Francis' paper, did not regard an acetoneuria as a cause for central blind-

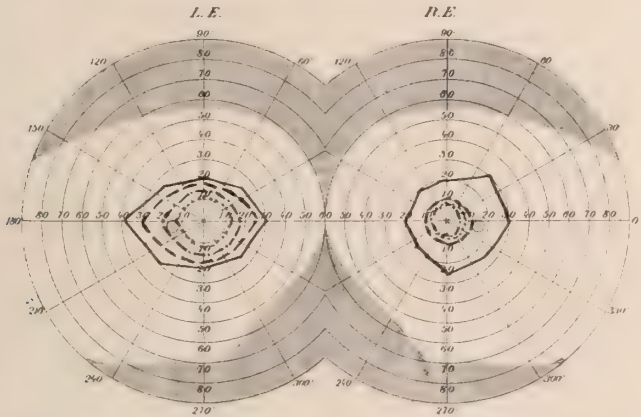


Fig. 15 (Mrs. J. E. B., May 20, 1916).—A good illustration of a case in which there are irregularities for form and colors without central changes.

further states that "in the absence of a clinical history, we have no means of saying on pathologic evidence alone, whether a given case is one of pellagra, or a central neuritis, or an alcoholic psychosis." Clinically these observations have been confirmed by Lorenz,<sup>17</sup> who compares the mental state of pellagrins with the toxic psychoses, of which alcoholism is a good example.

This evidence furnishes a clue, the study of which might bring more positive findings. It is reasonable to believe that the cause of the nerve changes that produce alterations in the visual fields and central areas is the toxic state which clinicians admit occurs in pellagra. It has been asserted by Harris, one of the foremost workers in pellagra, that an acidosis com-

ness, although it might be regarded as an accompanying symptom. Indeed, he says there is experimental proof that acetone has no selective action on the papillomacular bundle of the optic nerve. He further states that these scotomatous areas may represent a central retinal exhaustion, or perhaps a corticosensory fatigue, besides the usual lesion in the axis of the optic nerve fibers; and it is often difficult to arrive at a correct diagnosis.

Lohmann<sup>19</sup> mentioned that peripheral contractions, especially the "elastic" types, often occur in dementia precox, dementia paralytica, dementia senilis, and in conditions of severe depression, and are probably due to exhaustion.

From a study of these visual fields

two definite groupings can be made; first, those caused by organic changes in the visual path and, second, those changes that are purely functional in character.

Of the first group we at once recognize changes that resemble those commonly seen in a chronic retrobulbar neuritis caused by tobacco, alcohol or other toxic substances. And it is very possible, as suggested by Gradle,<sup>20</sup> that the vessel-bearing portion of the nerve is the part first affected, and the subsequent degeneration advances centripetally and centrifugally, involving the vertical oval fibers of the papillomacular bundle that are placed immediately anteriorly to the entrance of the central vessels, and later the V-shaped sector that occupies the temporal quadrant of the advancing nerve.

Again we must not lose sight of the fact that this degeneration or alteration may be in the central nervous system involving the visual centers. Of the second grouping the most striking change in many of the cases is the interlacing of the colors and the equality of the form and color fields—often of tubular character. This interlacing of the colors is highly suggestive of hysteria; in fact, Peter<sup>21</sup> maintains that other than by inaccurate measurements, only hysteria can cause this change. These ideas, coupled with the word of de Schweinitz mentioned previously regarding the scotomatous changes due to exhaustive processes, would strongly suggest that the alteration was a functional disturbance. And in a disease so chronic and so depressing as pellagra, in which every body tissue suffers from the profound toxemia, this complication is to be expected.

If the optic disk in all cases of pellagra appeared normal, one could read-

ily accept the view that these scotomas and contractions in the fields were of an exhaustive nature or one of fatigue; or, even more properly, a functional disturbance of the optic nerve. But, as often a decided pallor of the papillomacular bundle of the disc and frequently an optic atrophy can be clearly demonstrated in these cases, I am inclined to consider the change as an ascending or descending neuritis, with definite degenerative nerve changes as would occur in chronic retrobulbar neuritis caused by various drugs and alcohol. However, positive evidence is lacking by the inability to secure such specimens, when the diagnosis could be confirmed both clinically and microscopically. It is my impression of the disease that when the chemistry of this toxemia is satisfactorily explained, not only shall we have interpreted the cause of the chronic retrobulbar neuritis, but a great step will be made in determining the etiology and the specific treatment of pellagra.

#### CONCLUSION

I believe that we can definitely claim that (1) reduced vision is a symptom in pellagra, (2) that definite atrophic changes can be detected in the nerve head in a small proportion of the cases, and (3) alterations in the visual field with central and paracentral scotomas are common.

I wish to take this opportunity to express my appreciation of the hearty cooperation given me by Drs. J. Clarence Johnson, George C. Mizel, Stewart S. Roberts, H. F. Harris and J. Edgar Paullin of Atlanta, and especially Dr. B. McH. Cline of the staff of the Georgia State Sanitarium for the insane at Milledgeville. Without their aid this report would not have been possible.

#### BIBLIOGRAPHY

1. Calhoun, F. P. Visual Fields in Pellagra. *Ophth. Rec.*, v. 26, p. 63.
2. Roberts, S. R. Pellagra, St. Louis, C. V. Mosby Company, 1912.
3. Goldberger, Joseph. Pellagra: Causation and a Method of Prevention, *The Journal A. M. A.*, Feb. 12, 1916, p. 471.
4. Rampoldi. La pellagra e il Mal d'Occhi, *Ann. di ottal.*, 1885-1886, p. 99.
5. Whaley, E. M. Eye Symptoms of Pellagra, *Tr. Nat. Conf. on Pellagra*, Columbia, S. C., 1909, p. 229.
6. Quoted by Marie in paper 10.



7. Guita. Anatomia fisiologia e patologia della retinite pigmentosa, *Ann. di ottal.*, 1884, 13, 229-254.
8. Procopui, George. La Pellagra, Paris, 1913.
9. Tucker, B. R. Pellagra, with the Analytical Study of Fifty-Five Noninstitutional or Sporadic Cases, *The Journal A. M. A.*, Jan. 28, 1911, p. 246.
10. Marie, A. Pellagra, *English Trans.* by Lavender and Babcock.
11. Calderini. Notizie Medico-Statistica sulla Pellagra, etc., *Annali Universali di Medicina*, 1847, 123, 372-432.
12. Bietti. Sulla alterazione oculari nella pellagra, *Rivista Sperimentale di Frenitria*, 1901, p. 202-204.
13. Ridlon, J. R. Pellagra, *Pub. Health Rep.*, 1916, 31, p. 1979-1999.
14. Harris, H. F. Pallagra and Acidosis, *Jour. Med. Assn. Georgia*, 1916, 5, p. 217.
15. Dunlap, C. B. Pathological Changes of the Nervous System in Pellagra, *New York State Hospital*, 7, p. 488.
16. Spiller, W. G. *Amer. Jour. Med. Sc.*, January, 1911.
17. Lorenz, W. F. Mental Manifestations of Pellagra, *Pub. Health Rep.*, 1916, 31, p. 221.
18. De Schweinitz, G. E. Discussion on Francis, L. M.: Two Cases of Acute Retrobulbar Neuritis, Associated with Marked Acetonuria, *Sec. Ophth. A. M. A.*, 1914, p. 57.
19. Lohmann, W. Disturbances of the Visual Functions, translated by Angus Macnab, Philadelphia, P. Blakiston's Son & Co., 1913, p. 60.
20. Gradle, H. L. *Tr. Am. Acad. Ophth.*, 1916, p. 91.
21. Peter, L. C. *Tr. Am. Acad. Ophth.*, 1916, p. 59.

## NOTES, CASES, INSTRUMENTS

### A. PRACTICAL POINT IN THE TECHNIC OF CORNEAL TATTOOING.

SAMUEL THEOBALD, M. D.

BALTIMORE.

Read before the American Ophthalmological Society, July 10, 1918.

A case of rather extensive, and very irregularly outlined corneal opacity, the result of a penetrating wound of the cornea, with laceration of the iris, in early childhood, which recently came into my hands for tattooing afforded some ground for cogitation when the point was reached of deciding how I should proceed in the matter. A minimum of traumatism, because of the grave nature of the injury which the eye had suffered, and the insertion of the India-ink just where it was needed, and only there, were the desiderata.

At the first sitting, following my usual practice, I applied the ink to the cornea and pricked it in with a Weiss cataract needle. It was, almost at once, manifest, however, that this procedure was ill adapted to meet the conditions, for the ink completely obscured the field of operation, and it was quite

impossible to distinguish between the clear cornea and the irregularly outlined corneal capacity; furthermore, I could feel no assurance that I might not be stabbing, more than once, the same spot in the leucomatous tissue.

A trivial amount of irritation followed the operation, and in two days the condition of the eye warranted a repetition of the tattooing. This time, however, I reversed the order of procedure—first using the needle and afterwards rubbing in the ink. With an unobscured field, I could see distinctly the outlines of the corneal opacity, and tell exactly where the little oblique stabs should be made; and, besides, it was easy to avoid making more than one stab at the same spot. The ink was applied with a small cotton mop and gently rubbed in with a Daviel's curette. The cosmetic effect as observed the next day was most satisfactory, and only one more sitting, after the lapse of another twenty-four hours—the same procedure being then followed—was required to complete what I may, perhaps, be pardoned for calling the requisite "camouflage."

A cursory examination of the literature bearing upon the subject in my library showed that the procedure

which I had employed with so much satisfaction was not novel; but, on the other hand, it convinced me that its advantages were little known, for I found that a large majority of the authorities, in describing the operation of corneal tattooing, spoke only of the application of the ink to the cornea before the use of the needle or of pricking the ink into the cornea by means of a grooved needle. And it is for this reason that I have thought it worth while to make this communication.

Cocain in four per cent. solution, supplemented by a single application of a 1 to 1000 adrenalin solution, afforded very satisfactory anesthesia. Murdoch's speculum was used to keep the

## PECULIAR ANOMALY OF THE FUNDUS OCULI.

COL. S. HANFORD MCKEE, C.M.G.,  
C.A.M.C.

MONTREAL, CANADA.

Col. McKee, Officer Commanding at the West Cliff Canadian Eye and Ear Hospital near Folkestone, Kent, England, places on record this interesting anomaly revealed by the ophthalmoscope.

During the routine examination of a large number of men on service, many peculiar conditions of the fundus oculi have been seen. The following case was thought odd enough to warrant publication.

Private E. A. Y., aged 24 years, was sent to West Cliff Hospital for exami-

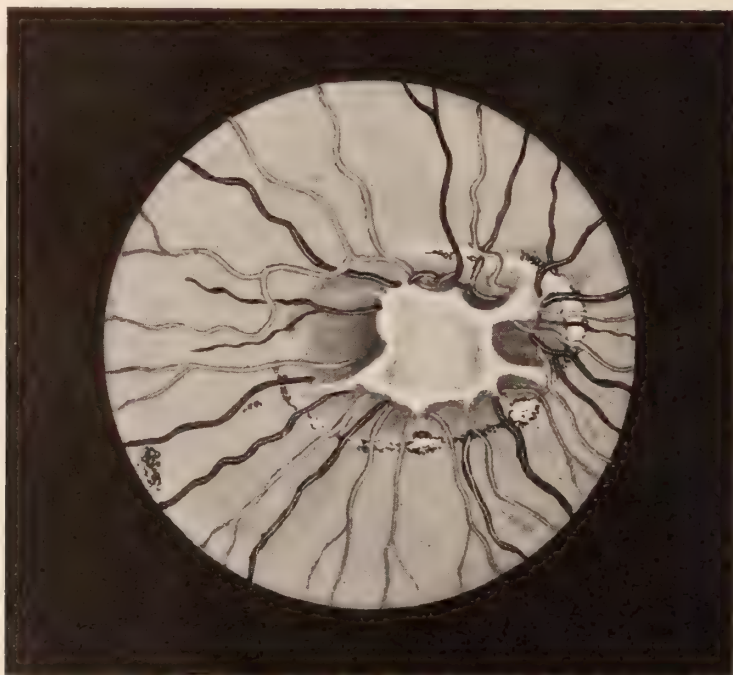


Fig. 1. Anomaly of fundus oculi (McKee).

lids apart, but fixation forceps were not employed, the eye being steadied by the finger-tip. The India-ink, which there is good warrant for believing contains no microorganisms, was not sterilized, but was rubbed up with a few drops of sterile water upon a suitable sterilized glass dish.

nation of the eyes. Vision of the right eye was perception of light, that of the left 6/6; nothing abnormal about the right eye externally. On examining the right fundus the picture seen was as follows: At the area of the optic disc one sees, instead of the disc, a rectangular pearly white membrane, attached

by bands to the retina at each corner except at the superior temporal. This membrane hangs in front of the retina like a curtain. It is a good deal larger than the normal optic disc and at the superior temporal corner slightly more than one millimeter from the underlying retina. On the superior border the artery runs along to the temporal part with numerous branches extending to the area above. To the nasal side and below the vessels are also profuse. About this membrane there are seen pigmentary changes denoting almost a complete rupture of the choroid. There are also one or two areas of displaced pigment in other parts of the retina. (See figure 1.)

This man gives a history of blind right eye from infancy. No history of injury. As a child he had been taken to numerous infirmaries, where examination of his right eye had always excited considerable interest. This case was sent to a large Ophthalmic Hospital for observation. The following are some of the opinions given on the condition:

1. A congenital coloboma of the sheath of the optic nerve.
2. A congenital defect.
3. A condition following injury at birth.
4. An inflammatory change in early fetal life and consequent formation of scar tissue in or on the disc.

### CONGENITAL DEFECT OF TAR-SUS WITH HYPOPLASIA OF MEIBOMIAN GLANDS.

KAZUO HIWATARI.

KAGOSHIMA, JAPAN.

The following case might be an extremely rare malformation of the eye, no one yet having described it, so far as my literature study can reach.

The patient here recorded, a virgin aged 18, attended our ophthalmologic clinic (the medical college hospital, Osaka) on account of discharge from her right eye, on March 10th, 1913.

On the left eye she had a leucoma

adherens subsequent to an ulcer of cornea from which she suffered in the sixteenth year of her age; otherwise she was quite healthy since her birth.

There were no malformations to be ascertained in her family history on exact inquiry.

The eyelids seemed quite normal externally and their motility was also excellent.

In respect to the borders of the lids nothing pathologic was to be found.

Now when I tried to evert the upper lids I felt unexpectedly an abnormal softness of them, owing surely to the absence of supporting tissue in them, as in everting the tarsectomized eyelids or the eyelids of a rabbit.

And therefore the upper lids must be kept everted during the observation of conjunctiva by the finger pressed under the skin of the lid. The lower lids were also very soft owing to the same reason.

Tarsectomy was absolutely denied, so that it must be concluded to be a congenital defect of the tarsus.

I made some further observations about the eyelids which I shall describe shortly.

#### THE MEIBOMIAN GLANDS

They were greatly reduced in their number and irregular in their form.

Some of them were namely narrower and longer, some of them wider and shorter than the normal, and again others were globular.

Beside them there were several small yellowish corpuscles under the conjunctiva which might be considered as the rudimentary formations of the Meibomian glands.

The Meibomian glands, including the rudimentary ones, were to be counted 20, 13, 8 and 10 upon the right upper, left upper, right lower and left lower eyelid respectively through the smooth conjunctiva.

The orifices were rudimentary and were to be pointed out upon the upper lids 8 and 13 in number on the left and right side, respectively, particularly only by means of loupe, while they



were by no means to be found upon the lower lids.

#### THE EYELASHES

They were generally arranged irregularly, particularly upon the lower lids, being counted in number:

- 108 Upon the right upper (longest one, 1 cm).
- 122 Upon the left upper (containing many minute ones, longest one, 1 cm).
- 55 Upon the left lower (longest one, 6 mm).
- 62 Upon the right upper (longest one, 6 mm).

A further abnormality of the eye-

lashes was the presence of hair follicles, one upon each right and left lower lid, from which two and three cilia jutted respectively instead of one, and such an abnormality of the eyelashes was exactly described by Contino (v. Graefe's Archiv für Ophthalmol. v. 81, p. 122).

The lacrimal puncta were found in normal position.

I believe that the above described case can be considered consequently as a congenital defect of the tarsus combined with hypoplasia of the Meibomian glands and their ducts, altho a microscopic examination was not performed and such an abnormality might be easily explained probably by atavism.

# SOCIETY PROCEEDINGS

## AMERICAN OPHTHALMOLOGICAL SOCIETY.—FIFTY-FOURTH ANNUAL MEETING.

NEW LONDON, CONN.

July 9 and 10, 1918.

President, DR. WILLIAM H. WILDER,  
CHICAGO.

*(Continued from page 795)*

### Ocular Conditions Affecting the Efficiency of the Aviator.

COL. WILLIAM H. WILMER, Washington, D. C., stated that, in addition to the stress of conflict common to all branches of the military service, the aviator is compelled to subject himself to changes of environment so sudden that there is but little opportunity for adaptive adjustments to occur. One of these changes is from normal sea-level oxygen tension to a tension much decreased.

Under conditions of lowered oxygen tension, certain well known physiologic alterations, adaptive in nature, take place. At the Medical Research Laboratory, conditions of lowered oxygen tension are produced artificially by means of a large low-pressure chamber and with the Henderson rebreathing apparatus. The tests made with these different forms of apparatus correlate so closely as to convince one that the physiologic changes noted are due to want of oxygen; and not to the lessened atmospheric pressure.

It is difficult to say how much of the disturbance in function is due to sub-oxidation in the central nervous system, and how much is due to changes in the muscles themselves. The increased need is met in good subjects by increased depth of respiration, dilation of the peripheral vessels and more rapid heart beats. More frequent respiration and increased blood pressure are clumsy attempts at adaptation, and the airman soon breaks under such tension.

While the eye is only one of the sense organs concerned in the function of the

equilibrium it is second to none in importance. We have found that its proper functioning is affected by oxygen want, apart from the other conditions of flight. In various accident reports from aviation sources, there is constant reference to the statements by pilots that vision was blurred during flight. We have, therefore, made tests to see what changes do occur in the eye under lowered oxygen pressure.

On the whole, we have not found any very marked change in the acuteness of visual perception. The great variations have been due to the falling off in the power of muscular adjustments. We have found very little practical change in color vision. The tests of the visible field indicate that the periphery of the retina is much more sensitive to oxygen want than is the macular region. Above 15,000 feet there is contraction of the fields for form and color. The tests at the laboratory also show that the field for the accurate perception of motion direction is usually about three degrees less in all quadrants than the field for form as usually taken. Stereoscopic vision does not suffer any serious impairment as the result of oxygen deprivation. The test for the simple visual reaction time has not seemed to us to be of much practical value, but the Reeves visual discriminating reaction time test is of great ophthalmologic-psychologic value.

The serious ocular disturbances produced in the peculiar environment of the airmen take place in the extrinsic and intrinsic muscular apparatus. There is, in many cases, a falling off in accommodation, convergence; and, naturally, in the fields of binocular fixation. With the failure of accommodation, it is impossible to read the figures upon the ever increasing number of instruments in the fuselage. The pilot has to shift his gaze quickly from the great expanse around him to the cockpit. Therefore, the accommodation must be not only accurate, but free from abnormal lag. So, too, the failure in convergence means double and confused vision.

As a result of these tests we are more and more impressed with the vast importance of the initial selection of candidates who possess good eyes and well balanced muscles, who have good adduction and who are practically free from hyperphoria. Equally important is the proper classification of the candidate, that he may be assigned to the work for which the laboratory tests have shown that he is best fitted. By the constant, watchful care of the flight surgeon and of the physical director, many cases of incipient staleness among the flyers can be detected; much economic waste can be avoided for the Government, and valuable young lives can be saved.

#### DISCUSSION.

Dr. Alexander Duane, New York City: Col. Wilmer spoke of the necessity of color vision in aviators. I should like to ask whether it is the color vision *per se* that is required, the ability to distinguish colors, or rather the light sense that is in question.

I was asked to examine a man who was coming up for the aviation section, and he was very definitely color blind. But being such a good man, they asked me to have another look at him and see whether he could be passed. I had to report that he was decidedly color blind in every test; but that, nevertheless, I thought that he could be tried practically, to see whether he would possibly do.

I did so for two reasons. First, that he had already had a year's flying, and a very successful one; and, second, that he was able to make extremely fine distinctions of light and shade, and apparently of color. Of course, he could not tell the colors as we do; but he could make distinctions at considerable distances. He told me that he never had the slightest difficulty, in cutting down, in recognizing a patch of green field, a patch of flower field, etc. It occurred to me, that our test in that sense might not be so useful. We might reject a man who might be valuable.

Col. Wilmer, Washington, D. C.—Certain classes of cases that are color blind do work in. For instance, we found a man could slip thru who was

totally color blind. We kept him as an instructor; but to a maker of maps or a combat pilot, color vision is essential. He must recognize the lights of his own airdrome and hangar, and be able to find his way home by noting the differences between the chimney pots and roofs. Color vision is essential.

Of course, we all recognize that there is no relation between color blindness and luminosity sense. The latter is sometimes very good in people with no conception of color values. There are certain types of air men who could be used very well, if color blind. But others, those who locate the enemy's artillery, etc., must have color vision. The enemy is clever in flying early in the morning, thus forcing our men to fly with the sun in their eyes. They must wear colored glasses. With weak color vision, they are unable to distinguish between the enemy uniform and their own.

#### New Instruments and Apparatus.

DR. WALTER L. PYLE, Philadelphia, Pa., exhibited and pointed out the advantages of a new *trial frame* for test lenses.

DR. CARL KOLLER, New York City, described his improved system of illumination for the *electric ophthalmoscope*. This substitutes, for the reflecting hypotenuse surface of a rectangular prism, a twice reflecting prism with a sharp edge upward; allowing the nearest approach to the pupil and so giving the largest field of vision. This system of illumination had been devised by Dr. Koller; and applied by the instrument maker to another ophthalmoscope without his knowledge or consent.

#### The Ergograph.

DR. LUCIEN HOWE, Buffalo, N. Y., discussed the present form and use of this instrument for measuring fatigue of accommodation and convergence. It is useless to explain the description of a complicated piece of apparatus without its being here. All I purpose to do, is to call attention to the test object for measuring the fatigue of accommodation. Last year, one of our exceedingly well qualified members made objections to it and suggestions concerning it, stating that what we called



fatigue of accommodation was not of the ciliary muscle but of the retina. I talked the matter over with Dr. Ferree of Bryn Mawr, who studied that aspect of it. He was of the opinion that it made very little difference whether we used a letter or an object. However, instead of using letters, what we used for exact test objects for the near point, and also for distance, is a series of characters, dots or squares, each one of which measures the angle of minimum visibility; and adjacent to it a space which also measures the same distance.

The present form of the accommodation ergograph includes the test object, the measure of the distance of the test object from the eye and the recording apparatus. The present form of the convergence ergograph includes an arrangement of the rotary prisms, and the recording apparatus. Dr. Howe discussed how to use the ergograph and the records of fatigue of accommodation and convergence.

#### **Inertia of Adjustment for Different Distances.**

DR. C. E. FERREE read for himself and Dr. Gertrude Rand the paper published in full on p. 164.

DISCUSSION.—Drs. Lucien Howe and Dr. William H. Wilder briefly expressed their appreciation of it. Dr. Walter B. Lancaster wished to bear testimony to the value of a visit to Prof. Ferree's laboratory, where some work was being done on accommodation.

Dr. Alexander Duane, New York City.—I, too, want to thank Dr. Ferree for his very suggestive paper, and to add one or two impressions that I gathered. He spoke of its practical application to aviators, its application to other branches of the service is equally obvious, and to none more so than the navy. The conditions there for seeing under different circumstances and surroundings, are such as call for just the kind of adjustments that he has spoken of.

For example, take an officer on the bridge of a battle ship in action: He has to make the quickest kind of ad-

justments of vision for far and near seeing of objects. There are all kinds of difficult conditions under which he has to make these instantaneous adjustments that Dr. Ferree speaks of. There the men who might seem to be normal by our ordinary visual tests may fail, because they cannot make the rapid or instantaneous adjustments referred to. A difficulty in recognizing signals and answering them immediately might spell disaster. A moment's delay in recognizing the turning of the ships with the comparatively small distance between them, and in responding to that movement, would also spell disaster.

Dr. Ferree said also that the question whether the speed of adjustment could be trained or not had not been determined. I believe that it can, like all other faculties that we seek to train. I believe that the ability to make these instantaneous discriminations can be trained by practice; and I think that is a very fruitful field for investigation, not only to determine whether people have these abilities or not, but, granting that they have them to a moderate degree, to enhance their ability by systematic training. That is a point that could be investigated and carried out to the great advantage of the service.

Dr. Ferree: I believe with Dr. Duane that this faculty can be trained; but I do not want to go on record as saying that it can be done. I have not the results to back that statement up. The three observers with the high power microscope averaged among the fastest, tho they had some slight difficulty.

The thing that interested me particularly was the diurnal variation; and I am interested in working out the variations of age, especially if we are going to have men of the age of Major Mitchell enter aviation. There is not only this particular coordination of the eye muscles to be considered, but the coordination of the general muscular system, which could be worked out in connection with this. That is, we could have the observer indicate with the feet whether the letters pointed right, up, down, or left, at the same

time that the time was recorded on the drum. This would involve all that an aviator would need.

It is commonly reported that aviators grow stale. We would have a record on his condition day by day, to see whether he was up to standard, or anywhere near it. Not only the motor coordination in the eye, which perhaps agrees with other coordinations would be known; but you could coordinate these with other tests, and have them reported simultaneously on the drum with the time of visual discrimination. You would then have not only accuracy, which most tests involve, but speed as well.

#### Restoration of the Orbital Socket.

Dr. P. N. K. Schwenk and Dr. William Campbell Posey, Philadelphia, Pa., stated there are two groups of cases to be considered. In Group A, there was complete occlusion of the socket, and restoration was made by the employment of pedicled flaps taken from adjacent parts. (See p. 55.) In three cases reported union was firm, and there was no trace of a fistulous tract produced by the passing of the skin flap under the bridge formed by the union of the two pillars of the canthus; nor were they bothered by an outgrowth of hairs from the flap. The desquamation of skin from the flaps gradually subsided, and the sockets became dry, and more and more commodious. The conformer should be retained a long time, and interfered with as little as possible.

The first case was one of entire obliteration of the socket, due to a lime burn. The operation was performed, using a long-pedicled flap obtained from the forehead. The patient was permitted to go home with the conformer in position. But, thru lack of attention, it was allowed to slip; and the tissues contracted so that the conformer was no longer retained. A second operation had to be done to remedy this, with the result that an artificial eye can now be worn with comfort; and the cosmetic result, apart from immobility of the eye, is perfect.

The second case was also one of ob-

literation of the socket, due to a lime burn. A similar operation was performed, the canthus being restored by the method employed in the former case after a conformer had been inserted into the amply spacious socket. On the fifth day, however, the stitches holding the pillars of the canthus in apposition gave way, necessitating some time later a refreshing of the edges of the flap, and a lengthening of the pillars. Union was then permanent, and a suitable sized eye is now worn with comfort.

In the third case, the eye was lost by a lacerated wound, demanding enucleation. In consequence of faulty technic in this operation, the upper lid was firmly bound down to the sub-lying tissues by dense cicatricial bands. The lower cul de sac was also somewhat contracted. The operation was performed by the author's method. Recovery was uneventful. A proper sized eye is now retained without difficulty.

In the opinion of the authors, the Maxwell operation is admirably adapted for the restoration of the lower cul de sac. The objection to it is the tendency that the lid evinces to ectropionize at its outer half, after healing has occurred. This may be partially overcome by making the flap narrower. Another ingenious method has been proposed by Golovine for securing an artificial eye after exenteration of the orbit.

Group B consists of cases with incomplete occlusion, some of the conjunctiva being still present. Wiener's method is especially applicable to this class of cases. Without having any knowledge of Wiener's contribution, one of the authors (Schwenk), in 1915, while attempting to restore a shrunken socket in which some mucous membrane was still present, used a procedure differing from Wiener's operation only in the location of the cul de sac anterior to the cartilage of the lid, instead of posterior to it. In the Wiener method, a large denuded area, from which the conjunctiva has been taken, is left exposed in the socket, and must be covered with

grafts; but in the authors' method, no raw surface at all remains. Dissection is done beneath skin and conjunctiva. This method was used in the following case:

A young man of twenty-eight, whose eye had been enucleated eleven years before on account of severe injury, had worn badly fitting glass eyes until cicatricial contraction had prevented their retention. The authors' operation was done; recovery was uneventful, and the result was all that could be expected, a proper sized artificial eye being worn with comfort.

The authors' method consists in undermining the orbital mucous membrane by a submucous incision, followed by a subcutaneous incision at the lid margin, thereby uniting the subcutaneous and submucous cavities. The dissected conjunctiva is transferred into the apex of the subcutaneous cavity, by the insertion of a series of double armed sutures.

DISCUSSION.—DR. TARUN—I want to endorse what Dr. Posey has said about the advantages of the Maxwell operation. The procedure is especially applicable to cases where the conjunctiva is somewhat contracted; and where the artificial eye has produced scar tissue in the lower cul de sac, with an eversion of the lower lid, or ectropion. The advantage is that if care is taken to attach the flap to the loose margin of the tarsal plate, the ectropion disappears and the lid comes into proper position. It is necessary to wear an artificial eye as soon as the operation is terminated, to keep the true margins adhering. At the same time, it produces a large sac in the lower part, and also produces inversion of the lid, which corrects the deformity. I have not had an opportunity to try it on the upper lid, but I am afraid that in the upper, the levator muscle has a great deal to do with the result obtained.

Dr. William Zentmayer, Philadelphia, Pa.—I have done the operation on the upper lid, and found that the levator offered no hindrance to perfect technic. I have done the operation six times, and the results have all been

very favorable. The mistake apt to be made is to make too broad a pedicle. All you need is a narrow sulcus. Eight millimeters is wide enough. It is the most ingenious plastic operation in eye surgery. I saw a case recently in which I had operated on both lids four years before. I found the floor of the orbit perfect. In the operation of Dr. Weeks, satisfactory as it often is, the shrinking gives an imperfect result with lapse of time. That was my experience in the one case in which I tried it.

Dr. Edward B. Heckel, Pittsburgh, Pa.: It is not only the difficulty with which these operations are done, or, rather, the difficulty in arriving at a successful conclusion. I have had the privilege of operating on several cases in the last ten years, and used a single piece of autogenous epithelial graft to restore the socket in partial or complete destruction. I have a drawing of a case on which I operated a year ago last March, the photograph of the individual wearing an artificial eye. There was only partial destruction of the socket. The upper part was destroyed by a burn.

The dissection was made to enlarge the socket, and one piece epithelial graft was taken from the inner surface of the arm. The conformer was made by taking a piece of wet cotton sufficient to entirely fill the socket. That was covered with a piece of rubber dam, tied in front with a piece of strong silk. The external canthus was slit. After the conformer was made, the one piece epithelial graft was laid over the conformer, with the epithelial side against the rubber tissue. The lids were pulled down, and a compress bandage was put on quite firmly.

The case is inspected; and if there is no odor or discomfort, the bandage is allowed to remain six or seven days. When the bandage is removed and the conformer taken out, the socket is as large as the conformer. The dressing is removed daily, and a small amount of bichlorid vaseline, 1:3000, is applied to the socket. I have had no graft that has not taken. The excess shrivels up and disappears.



I find that in taking a graft, it is almost impossible not to have some hair on it, and some sweat glands. I operated on a case in which the entire socket was destroyed. I took the skin from the inner surface of the arm, and found, after a while, that there was a growth of hair and odor from the socket, as a result of the sweat glands that were in the graft. The glands have degenerated, and disappeared, and so have the hair follicles; so the hair has disappeared. The transplantation of a few hairs and sweat glands does not appear to be objectionable.

Dr. R. A. Reeve, Toronto, Can.—Dr. Heckel is to be congratulated upon anticipating a line of treatment that is in vogue now in France and Great Britain. It was spoken of by Sir Arbuthnot Lane on his recent visit. He said that they restore the orbital cavity in very serious injuries by simply making an incision, more or less deep; and taking, as the doctor did, the epithelial graft and applying it as he has done. They use the hard material that dentists use for taking casts, select an appropriate size, apply the graft on it, and stitch over it; so that the whole thing is tight.

The explanation of the losses of transferred flaps, that we sometimes regret so much, is that you do not keep the whole surface in contact with the raw underlying surface. By stitching the whole flap in tightly, you get perfect contact. They do not require to use their sense of smell, but just leave it *in situ* from five to ten days; and they have a perfect cavity. In addition, if they wish to resort to any measure to apply the artificial eye, they simply make a second incision, and put in a piece of cartilage, stitching the new epithelial surface over the cartilage. That takes, and they put in the eye. The result is very gratifying indeed.

Dr. William H. Wilder, Chicago, Illinois.—It has been my privilege to do a good deal of this work at the Illinois Eye and Ear Infirmary. We have used, for holding our grafts firmly in the socket, plates of lead, tin, or the

gutta percha material that dentists use, which can be molded to hold the flap in place. This method originated with the late Dr. Hotz and has been adapted and modified in various ways. These cases of total symplepharon of the orbit, and other cases of it where the eyeball is present, are adaptable for such treatment.

I have found, in almost every case, that a Thiersch graft, or a modified Thiersch graft, was as valuable as a Wolfe graft. I call a modified Thiersch graft one in which you not only take the epithelial layer of the skin, but go down in to the dermis proper and get firmer tissues, without going into the subcutaneous tissue. The difficulty with the Wolfe graft is that we do not dissect off the subcutaneous tissue and get rid of the fatty elements. With the modified Thiersch graft, you get a graft of good firmness, if necessary.

In preparing the socket for the plate, by taking away the redundant superficial tissue and scar tissue, the socket is made deep enough, above and below, to hold a plate that you have fashioned out of lead or tin, and easily keep it firmly in place. This plate can be covered with paraffin with a high melting point, and thickened to any degree desired to fill the socket.

After cutting off the Thiersch graft from whatever site you select, if you put the epithelial surface of the graft next to the paraffin surface of the plate, it adheres to it, and you can introduce it into the socket you have made. In forty-eight hours you can remove the plate, inspect it, turn it, and put it back in place; and you could keep it there until you are ready to apply the artificial eye.

Dr. Schwenk: Werner devised an operation to use where there was less contractility present, which it would be well to mention. He dissects as much of the conjunctiva as remains in the orbit up to the margin of the lid. Then he deepens the posterior cul-de-sac. He puts a flap right down into the apex, and fastens it there, and covers the raw surface remaining with Thiersch grafts.

### Orbital Growths Removed with Preservation of Vision.

DR. WILLIAM CAMPBELL POSEY, Philadelphia, Pa., reported cases in which the growth was removed through an incision along the external orbital rim, permitting a Kroenlein resection of the orbital wall if found necessary.

Case I.—The patient was a male, aged forty-eight years, whose right eye had begun to proptose six years before examination. There were no inflammatory signs, and no history of trauma. The Wassermann was negative. The eye was fourteen millimeters in advance of its fellow. There was no palpable mass, nor could the eye be pushed back by pressure.

By an incision at the outer orbital rim, there was removed a large encapsulated tumor, the size of a small hen's egg, situated posterior to the globe, and lying in close approximation with the optic nerve below, but without connection with it. Two months after the operation, the proptosis was reduced to four millimeters. There was some limitation of outward motion. Pathologic examination revealed a spindle-cell sarcoma.

Case II.—The patient was a male aged twenty-nine years, in whom there had been gradual protrusion of the right eye for five years. The man's health was good; there had been no trauma, and the Wassermann test was negative. The eye was ten millimeters in advance of its fellow. No mass was palpable, and there were no fundus changes.

An incision was made at the outer angle of the orbit; and a mass, the size of the eyeball, was found resting upon the optic nerve, posterior to the globe, and somewhat to the outer side. It had a firm capsule, with no attachments. At the end of two weeks there was still a slight exophthalmos with some ptosis. The pathologic examination proved the growth to be a fibroma.

Case III.—The patient was a female, aged twenty-seven years, whose right eye had been prominent since early childhood; but there had been no apparent increase in the protrusion for

the past ten years. Her health was good, and the result of a Wassermann test was negative. The eye was eight millimeters in advance of its fellow. A smooth, hard mass was palpated at the upper angle of the orbit. A cyst with a firm capsule and dermoid contents was removed without difficulty. At the end of a month the proptosis had almost entirely disappeared, but there was some ptosis and limitation of the external motion of the eye. The pathologic examination showed the mass to be a dermoid cyst.

Case IV.—The patient was a female, eighteen years of age. She had noticed gradual protrusion of the left eye for eight months. She had typhoid fever three years previously, and the left postcervical and submaxillary glands were permanently swollen. There were no inflammatory signs. Examination for tuberculosis and syphilis was negative. The blood count was also negative. The eye was down, and somewhat out, seven millimeters in advance of its fellow. There was a palpable mass under the upper, outer portion of the orbital rim.

No fundus changes could be seen. The glands at the posterior border of the left sternomastoid muscle were markedly hypertrophied, and the same condition prevailed in the glands of the left submaxillary region. A tumor, the size of a large almond, was successfully removed by incision over the mass. The globe returned to its normal position in the course of several weeks. The pathologic examination showed the tumor to be an adenoma.

In all of the four cases, X-ray examination of the orbit and surrounding sinuses was negative; nor did a nasal examination show any evidence of existing sinus disease. These cases show the advantage of prompt operative measures, and the futility of tentative medicinal and other forms of palliative treatment in most forms of orbital neoplasms.

The author's method follows the Kroenlein procedure until the resection of the bone is reached. This is done in such a manner that the whole orbital apophysis of the malar bone is dis-

placed, without splintering, in one block, so that it can be replaced at the end of the operation.

### Two Orbital Tumors.

DR. A. EDWARD DAVIS, New York City, read the report of the two cases, published in full, p. 828.

### Sarcoma of Orbit, Treated by X-rays.

DR. WILLIAM M. SWEET, Philadelphia, Pa., read the paper reporting a case, published in full on p. 830.

DISCUSSION:—DR. J. H. CLAIBORNE, New York City: The Kroenlein operation is popular. It gives an opportunity for a surgeon to exploit himself. But I am convinced that it is not necessary in the majority of cases to do it, unless, by chance, the tumor is disseminated throughout the orbit.

I had the case of a woman of forty-five years, whose left eye was proposed and who had diplopia. I made an incision over the rectus and found a hard tumor, to which was attached the lacrimal gland. With my finger, I got behind the tumor, resembling a decidedly large olive, without any difficulty. I found it necessary to shave off a little of the external part of the orbit, and I could look in very well. The operation was done so easily on that occasion, I have never found occasion to do the Kroenlein operation, and should like to know whether others have been able to achieve these results without that larger operation.

DR. R. A. REEVE, Toronto, Can.: I should like to ask Dr. Davis why, after an interval of a week, he did a secondary operation. His was a case of endothelioma. A good many years ago, by a large incision, extending through the lower part of the brow, from the external to the internal margin of the orbit, I was able to remove a sarcoma of the lacrimal gland. I simply peeled off the periosteum of the roof of the orbit, removing, of course, the gland itself, and the patient lived for two years, at least, and died from some acute disease which could have no connection with secondary development from sarcoma.

The doctor spoke of there being no

recurrence for, I think, twelve years. I reported, some years ago, before this society a so-called recurrence of sarcoma of the orbit, fourteen years after having enucleated the eye which contained the original sarcoma, and I expressed the opinion that I really did not think it was what you would call a recurrence. If a man lives to the age of fifty-six without the development of sarcoma, and the view is correct that it is a development of the embryonic tissue, why should not this occur in another part without its being a recurrence, when the man is fourteen years older? I do not think that we should always speak of a recurrence of the growth. I think that one can actually circumscribe the disease, and have an appearance *ab origine* at another site.

DR. POSEY: Dr. Claiborne has given us an intimation that, to his mind, the Kroenlein operation should be limited to growths disseminated thru the orbit. To my mind, the indication is a localized growth. If there is a disseminated growth, especially if it is malignant, the thing to do is to take out all the parts, as well as the tumor. As to sewing up the periosteum, I confess not to have found the periosteum of these cases such a tangible tissue as would enable one to sew it. We have found, at Wills Eye Hospital, that fulguration after removal of tissues in the orbit for malignant growth is a very valuable means, for a time, in the checking of further extension of the growth.

DR. DAVIS: I should like to answer Dr. Reeve's question regarding a secondary operation. I did that because I considered an epithelioma to be a malignant growth, belonging to the carcinomatous group, and because I had not done the major operation of removing the growth in the forehead, which was an inch and a half in diameter. Dr. Judd performed that operation, and found that the meninges of the brain had been absorbed, and that the tumor extended into the brain itself. That is why we did the secondary operation so soon. I was interested to know, after we got into the second growth, that it was considered to be a glioma, and especially to have it as the opinion of so



eminent a man as Prof. Ewing, that it was the third growth of the kind that he had had under observation. The question is, whether we could get a glioma following a sarcoma. I should like to have the opinion of some of our pathologists on that point.

Dr. Claiborne: Regarding the removal of the eye first, I have no objection to it whatsoever. My opinion was based on a case that I saw Dr. Posey operate on some time ago, a large sarcoma of the orbit. He cut above the brow, and attempted to remove all the tissue, but could not get all out, and sewed it up. The patient lived for several years afterwards. It struck me that had he done a Kroenlein, he might have gotten out more, and prolonged the patient's life still further. I think that in certain cases of that kind, where the sarcoma is extensive, it might be well to try the Kroenlein operation. The patient lived three or four years, and was seventy-five years of age. The case has been reported before.

#### **Ophthalmoscopic Conditions Simulating Sarcoma of the Chorioid.**

DR. HARRY FRIEDENWALD, Baltimore, Md., read the paper published in full on p. 822.

DISCUSSION.—Dr. Hiram Woods, Baltimore, Md.: Dr. Friedenwald has been kind enough to let me observe one or two of these cases with him, and I can bear out the truth of what he says. I could not make the diagnosis on the ophthalmoscopic appearances, but the question of transillumination comes up. I recall the generally accepted principle that you get transillumination in non-malignant growths, and do not get it in the others. Fridenberg, I think, was the first to tell us about it.

Basing my procedure on that opinion, I two or three years ago enucleated the eye of a child three or four years old, with a large mass in the vitreous, without any evidence whatever of previous inflammatory trouble. The transillumination was completely shut off, and yet it proved to be a double inflammatory deposit. I saw one of the cases that Dr. Friedenwald formerly reported, in which this massive exudate

was evidently getting larger, with inflammatory reaction. We do not know much of the pathology of this class of cases, but we should have some way of diagnosing them.

Dr. Arnold Knapp, New York City: The principal elements of the cases that Dr. Friedenwald describes, I think I have seen two examples of, and in both there was a circumscribed mass characterized by having a curious dead-white grayish color. There was no inflammatory symptom, so far as the optic nerve was concerned. Both were in patients around thirty. The feature that both had was, that in the neighborhood of the swelling there was an area like the degeneration we find in certain types of retinal disease, a little bank of hemorrhages with exudates; and I should like to ask whether that was observed in the first case. These two cases are being watched. The diagnosis of a probable solitary tumor was made. The process has remained stationary in one case for three years, and the other I have not seen for a year.

Dr. Friedenwald: There was no sign of inflammation nor hemorrhage, and the retina and optic nerve in the first case were normal. Vision was almost perfect at the time of enucleation.

#### **Transient Homonymous Hemianopsia.**

DR. HENRY H. TYSON, New York City, read the paper on this subject published in full on p. 831.

DISCUSSION.—Dr. J. H. Claiborne, New York City: Dr. Tyson referred to a case that I reported several years ago. As I stated at that time, this man was an alcoholic subject. He did not drink all the time, but had periodic tears. Being quite ill after one of these, he was given large doses of salicylat of soda. Several doctors in his home town could not find out what was the matter with him. I made a careful examination, and discovered it.

The day before yesterday, while I was looking over this paper, a young man, sixteen years of age, came into my office with astigmatism of six diopeters in the right eye, and slight astigmatism in the left eye. He stated that, from time to time, he had little

defects in vision. One week before he had been taken suddenly blind and, at the same time, the right arm was numb and the entire right side. I examined him carefully at that time, and a week or ten days afterwards, and there was no difference whatever. The optic nerve was normal, and the hemianopsia had disappeared. I never saw a case of this transient, fugacious hemianopsia in a person so young as that. He was not a neurotic subject.

### Technic of Corneal Tattooing.

Dr. Samuel Theobald, Baltimore, Md., read the paper on this subject published on p. 847.

### Hypermetropia Responsible for Heterophoria, Astigmatism, and Myopia.

DR. S. M. PAYNE, New York City, read a paper with this title which will be published in the next issue of this Journal.

Dr. J. H. Claiborne, New York City: I am acquainted with Dr. Payne's work in the past, and regret that time is lacking for all to discuss it. The paper represents a great deal of thought and deliberation, and shows wonderful patience in the study of that subject. One point that I should like to make is regarding the causation of myopia. Some years ago I wrote a paper on the management of myopia, and made a plea for its complete and perfect correction in youth, based on the view of Gould. When Dr. Payne speaks of hypermetropia as the cause of myopia, I do not quite understand his contention.

Dr. Payne: Dr. Claiborne said something about myopia. I do not know that I have ever seen a case of posterior staphyloma with less than eight diopters of myopia. We have cases of myopia before it reaches that stage, where the fundus looks entirely normal. We see sometimes, in these cases of myopia, a purple line around the cornea, showing that the sclera is thin and shows the choroid through. I think the constant pulling of the muscles in high degrees of hypermetropia

increases the astigmatism. The cornea may be conical, and that increases the depth of the anterior chamber. I do not see why the pulling of all these muscles from that particular point would not increase the curvature anteriorly to a sort of conical form. I believe that this is the start of myopia, and that later it extends to the back part.

### Conservative Treatment of Asthenopia in Children.

DR. EDWARD R. WILLIAMS, Boston, Mass., urged that the conservative treatment of asthenopia in young children requires the careful assembling of facts. First get the refractive data; then attempt to separate real from apparent complaints of the child which simulate asthenopia; finally give glasses for large refractive errors. For doubtful cases get a careful history from the parent and start palliative treatment while keeping the child under observation. After two weeks' treatment with soothing collyria all asthenopic symptoms often cease entirely. Palliative treatment means a larger proportion of pupils do not receive glasses until general treatment has been tried. The temporary decrease of vision accompanying conjunctival irritation needs only conservative treatment with collyria. Observe the mental attitude of the child; a resignation to the inevitable will stop eye-strain complaints. Decreased accommodation, after study or play, is a handicap to effective preparation of home lessons.

DISCUSSION.—Dr. S. M. Payne, New York City: A child with hypermetropia may refuse the glasses. One with two or three or four diopters may refuse any glasses for his distance. These children always hold the book too close. They do it to magnify the letters. If you will put a convex glass on the patient, you may get the full correction. The nearer you come to the total amount of the hypermetropia before that child's eyes, the further he will move the book away.

# SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS, OF PHILADELPHIA.

October 17, 1918.

DR. S. LEWIS ZIEGLER, Acting Chairman.

## Diagnosis of Motor Anomalies of the Eyes.

DR. ALEXANDER DUANE, of New York, addressed the Section by invitation, on "The Basic Principles of Diagnosis in Motor Anomalies of the Eye." He said that tests for the ocular muscles must obviously be based on answers to the following questions:

- (1) What are the normal movements of the eyes singly and in conjunction?
- (2) What are the possible perversions of these movements, and what distinctive evidence of its presence does each particular perversion afford?
- (3) What are the most ready means of bringing these distinctive evidences to light?

The first question was subdivided into the following queries: (a) What are the actions of the individual muscles of the eye? (b) How are these coordinated to move each eye by itself? (c) What are the coordinated movements of the two eyes acting together?

Dr. Duane then discussed these questions under the headings: (1) Action of individual muscles. (2) Monocular movements. (3) Binocular movements. Following this he spoke of the varieties of Motor Anomalies: (a) Affections of conjugate movements, (b) Affections of convergence, (c) Affections of divergence.

Finally the tests to be used and what they determined were discussed in detail.

Dr. Duane's paper did not readily lend itself to abstraction, and accordingly to appreciate must be read in full.

DISCUSSION.—Dr. Howard F. Hansell thanked Dr. Duane for his profitable and interesting essay. The subject as presented was so comprehensive that Dr. Hansell limited his remarks to one or two points only. He was

particularly interested in the emphasis laid upon the physiologic action of the muscles, first of one eye and second of both eyes in association, for unless our conception of physiology is clear, our interpretation of pathologic states will be obscure. Dr. Duane stated, for example, that outward rotation was accomplished by the contraction of three muscles, the external rectus and the two obliques, the eye being held in equilibrium by the superior and inferior recti, and of the six muscles only one is inhibited. It can be readily understood that this apparently simple function is in fact a most complicated one.

The contraction of one set of muscles must be balanced exactly not so much by inhibition as by relaxation of the antagonists, and how much more complicated it is when we remember that the muscles of both eyes act simultaneously in equal degree of contraction and relaxation. Thus in every movement the twelve extraocular muscles and at least three pair of cranial nerves with their centers and cranial connections are involved. It would seem that treatment directed to the changing of the attachment of one or even two muscles by operation might be successful in only a small proportion of cases.

Dr. Hansell thought that probably the most accurate test for the detection of low grades of phorias was the Maddox rod. For degrees higher than two, he had found the cobalt glass satisfactory. Thru it the image was small and colored and easily recognized in a moderately darkened room, and its position in relation to the true light signifies correctly the altered direction of the visual axis of the eye behind it.

Dr. William Zentmayer said he could add nothing which would further clarify the subject which Lieut. Duane had so elaborately and lucidly presented. He thought it might be of interest, however, to state his experience with the different procedures employed for diagnosis. In teaching he had found the axiom that "the false image has the position and inclination which the affected muscle gives to the eye when



acting normally" and that "in paralysis of the elevators and depressors, that the eye is paralyzed whose image is the lower, the correlation of the terms elevator and higher, and depressor and lower help to fix the relations of the false images." The groupings of the vertically acting muscles has also been of great value.

In working out a case one of the difficulties in studying the images when unassisted is to have the patient keep the head in the primary position. While he had no experience with the method of Bielschowski, advocated by Landolt, of having the image fixed and moving the head of the patient to obtain the different cardinal positions, it would seem to overcome this difficulty. When we consider how rarely by the ordinary methods the patient is able to recognize the tilting of the false image in paralysis of the elevator and depressor muscles, we appreciate the debt we owe to Mauthner and Duane for emphasizing the advantage of making a differential diagnosis by the difference in the vertical separation of the images in adduction and abduction. By using a long test object such as a cane, the tilting of the image is made easier of recognition.

The screen test is of especial value, as it is an objective test. With the parallax test Dr. Zentmayer had found it difficult to have a patient of ordinary intelligence recognize the movement of the image. In studying heterophoria he routinely used the Maddox rod, as it had always seemed that the displacement of the image on the retina which the phorometer produced, introduced a complicating factor.

Dr. S. D. Risley thanked Dr. Duane for the very clear statement he had given of the groups of muscles involved in the associated movements of the eyes in the cardinal fields of binocular fixation. In his personal expe-

riences Dr. Risley had found that abnormalities of the binocular balance, excluding paralysis, might be classified into two general groups, relative and absolute; the latter being due to some abnormality in the attachment of one or more muscles of the group, and were usually associated with anomalies in the form of the orbital walls, and these were due to distortions of the anterior segment of the skull.

In the routine of office work, the main difficulty was to discover which muscle, or associated groups of muscles, were faulty; since the secondary or spastic contractions of the opposing muscles were often misleading. He felt that it was important to place the patient at rest under, for him, unusual conditions, so that he could not use the efforts he was accustomed to make, to correct the abnormality of balance.

For this he himself employed a fixed apparatus he had devised, in looking through which the patient had a circular field as in a binocular field glass. Dissimilar images in the two eyes were secured by a dark ruby glass over one and a multiple Maddox rod over the other. Fixation was on a small point of light placed at six meters at the height of the patient's eyes. This secured a primary posture and removed all tendency to overcome by strain the existing abnormality.

It was important that the accommodation should be completely set aside, by the continuous use of a cycloplegic and a glass correcting absolutely the static refraction of each eye. These should be carefully centered in the apparatus, and all measurements of the binocular balance made through them. While he agreed with Dr. Duane as to the value of the cover or screen test in many conditions, he used in preference to this the conditions above described.

J. MILTON GRISCOM, Clerk.

# ABSTRACTS

**Poulard and Real. Enlargement and Regulation of the Orbital Cavity for Prosthesis.** (*Ann. d' Ocul., Jan., 1918, p. 41.*)

These authors comment on the lack of permanent results which tend to follow operations for the restoration of the conjunctival sac. Cutaneous flaps are not successful, because they are placed in a cavity already too shallow, which they make more so. Epithelial grafts are less open to this objection, but they are too delicate and the results are poor.

Pieces of glass or hard rubber placed for a long time in the cavity increase it slightly, but cannot distend it because they are loose and can exert no pressure. In order to accomplish this, the authors constructed an apparatus which is comfortable and exerts a selective pressure action on the parts requiring it. It consists of a plate conforming to the upper orbital margin, modelled in the way a dentist makes a plate, held in place by elastic bands which pass around the occiput and prevent its displacement. This makes a firm support for the active part of the apparatus, which is a vertical steel rod with a groove in a tube attached to the plate. It can be raised or lowered at will. To the lower part of the rod is fastened another tube. Screws permit the rods to be fastened at any length. The second rod terminates in a discoid plate, upon which is to be placed the plastic mass which is to be moulded upon the irregularities of the cavity. By means of these rods the plastic dilating mass can be moved in any direction.

The first step in the operation is to take an impression of the cavity, and a model is made in three pieces. Cicatrices present are cut, and this is followed by application of the dilating apparatus. The disc is covered with a soft plastic mass, which is introduced into the cavity and pressed moderately against the walls so as to take on the contour of the cavity, and especially

so as to interpose between the cut lips of the cicatrices. By means of its attachment, the plate is anchored firmly to the orbital margin and remains in place day and night, being removed only once or twice a day to clean the cavity. It is well borne by the patient. On the succeeding days plastic matter is added until the desired result is obtained. Then it is replaced by a definite mass of vulcanized rubber. Epidermization must be complete before the artificial eye is inserted. Even afterwards, the apparatus should be worn at night if there is any doubt about the permanence of the result.

C. L.

**Koster-Gzn., W. Spontaneous Resorption of Senile Cataract and Other Spontaneous Cures.** *Zeitschr. f. Augenheilk.* v. 36, p. 57.

In 1913 this author saw a healthy, strong man of 77 years who stated that in his fiftieth year he had begun to suffer from cataract; with the right eye especially he was very soon unable to see; in the left eye the cataract progressed but very slowly. Twenty-five years ago, i. e., two years after his affliction had begun, Prof. Snellen proposed the extraction of the cataract in the right eye, but patient had refused. Up to the time when author examined him he had been able to do his work fairly well with the left eye. He had never suffered from diseases of the eye nor from other diseases frequently associated with cataract; the cataract has been diagnosed previously, just as now by the author as a senile cataract.

On January 22, 1913: V., L. = 3/60, with 2.5 = 6/24; cataract. R. = 5/50, with + 9 = 6/60. Deep anterior chamber with pupillary opacity which in several places when light was transmitted, allowed the penetration of red light. When the pupil was dilated no remnant of the nucleus of the lens could be found. Normal pupils on both sides, normal tension and good projection. It is therefore, a case of

spontaneous resorption of a senile cataract of the right eye.

Jan. 27, 1913, discision of the membranous cataract with two needles according to Schweigger. Jan. 30, V., R. with  $+10 = 6/12$ . Oct. 13, with  $+10 = 6/6$ .

No swollen remnants of the lens were visible in the pupil. The lower V. during the first three days after the operation was caused by mydriasis, as the remnants of the membrane still disturbed the vision.

Author saw the patient again in September, 1915. The left eye had now 4/60 with  $+2$ ; the anterior chamber had become somewhat deeper, so that it appears as if in this eye, too, resorption of the lens had begun.

It has been impossible to find any cause for the resorption of the cataract; in patients of this sort there must be some determining factor, either in the whole body or in the eye, for this unusual process, since the lens does not become overmature and calcified in the usual way; but from the very start is affected in a different way by the fluids of the eye and, altho very slowly, dissolved. It would be a great triumph if we could start this process at will, for the patients would undoubtedly prefer this spontaneous cure, no matter how satisfactory the results of the operation for cataract are. It does not seem impossible that we may yet be able to accomplish something in this direction.

In connection with the just mentioned spontaneous cure of senile cataract, it may be permitted to remind the reader that the same thing happens in young children. In those cases we are not in a position to state that the cataract is not a traumatic one or that a trauma may have precipitated the absorption of an already existing cataract. We then, as is well known, find only a cataracta membranacea. A second mode of spontaneous cure of cataract in the aged, that of spontaneous luxation, is not so very rare, though a slight commotion of the body, due to a misstep, etc., is usually a necessary condition. The author had opportunity to observe several such cases, and altho

the eye with a cataracta untena is always exposed to secondary glaucoma, thus possibly making an extraction absolutely necessary, author has been able to observe others for many years, the eye quiescent and with excellent vision. But it is just this danger of increase of pressure or even chronic cyclitis which restrains us from imitating this natural form of treatment. Nature's process was most probably imitated in those successful cases of reclinaton or pushing down of the cataract without injury to the lenticular capsule, which was practiced in older times. The other cases, and they were probably in the majority, in which the cataract was injured, must have become a prey to either acute or chronic iridocyclitis, since the lens tissue affords a good medium for the growth of the bacteria introduced during the operation; and if the lenticular capsule was injured there must have been an inflammation of the ciliary body even without infection, since the swelling tissue was of the lens which if pushed deep down into the vitreous body, would cause inflammation chemically and even purely mechanically. The lens therefore should never be touched by a sharp instrument if, as has been recommended in several quarters, we should practice the depression or reclinaton of the lens even today. It would seem best, after making a small opening with a narrow knife, to insert a dull needle into the anterior chamber and to tear off only the zonula with this instrument. In this way the uninjured lens can be luxated fairly easily in the pig's eye, though it is more difficult to push it down. The author has never performed the operation on the human eye.

**Moncrieff, W. E. S.** Treatment of Trachoma by Excision of the Tarsus and Tarsal Conjunctiva of the Upper Lid. Indian Medical Gazette, Vol. 51, No. 8.

Trachoma is probably the most frequent cause for rejection of otherwise desirable recruits for the Indian Army. It very often complicates other eye diseases, and in itself causes an enor-



mous amount of partial and total blindness.

On a recent tour in Marwar (Jodhpur State) the author made the following note of cases seen in three district dispensaries, in which there were sixty-four blind eyes in forty-two persons, mainly due to trachoma with its complications—pannus, ulcer, perforation, entropion, xerosis, etc. He noted that one rejects a recruit with trachoma straightway; and it is therefore not prevalent in the Indian Army, owing no doubt to the strict medical examination before and the healthy existence after enlistment.

As regards treatment, he considers that astringents, caustics and resorbents are hopelessly inadequate; and he has gathered rather damning evidence as regards the caustics and copper. Carbon dioxide snow has been tried and found to be no more efficacious than caustics. Few cases are suitable for expression and grattage. Subconjunctival injections are disappointing. Excision of the conjunctival fornix has been done only a few times. Previously to last year, he has occasionally removed most of the tarsus as a modification of the Snellen operation, but recently has done it more often.

There are two methods of operation, one a simple excision, leaving a raw surface, the other an excision followed by undermining and suturing of the conjunctiva. Both are described in detail. Either being similar to those operations in vogue in America. He has excised the tarsus of the lower lid in three cases, but it is as a rule, unnecessary. As the results of the operation, the lid does not lose its shape. On the contrary in advanced cases, its shape is improved and the levator muscle can still exercise its function.

It seems that the secretion of the

Meibomian glands is so altered by the disease that nothing is lost by their removal.

At one hospital he has done the operation on 47 eyes, having records of 54 cases, 26 simple excision, 15 excision with suture of conjunctiva, 13 simple excision with removal of skin for entropion. He considers that involvement of the tarsus causing thickening and deformity or short of this, commencing cicatrisation in the tarsal conjunctiva, with or without corneal complications, are absolute indications for excision. He does not operate during an exacerbation of the disease.

The social standing of the patient, particularly in India, should be noted; as, for instance, a case with early trachoma may appear once, and if only given temporary relief it may be years before it comes back and then generally blind without hope of recovery of full vision. Likewise, case and results of operation are noted.

H. V. W.

**G. F. Cosmettatos.—Recurrent Epithelioma of the Ocular Conjunctiva.**—*Ann. d' Ocul.*, v. 155, p. 32.

Cosmettatos describes a case where death occurred as the result of metastasis in the larynx, in spite of two operations. The first was by a careful dissection of the tumor and extirpation with normal conjunctiva, followed by cauterization of the base. One year later the patient returned, with a large tumor mass covering the eye. The eye was enucleated and as much of the conjunctiva as seemed to be affected was removed. The tumor was found to be an epithelioma, which had invaded the corneal parenchyma and even the canal of Schlemm. Three illustrations of sections of the tumor accompany the article.

C. L.

# American Journal of Ophthalmology

Series 3, Vol. 1, No. 12

December, 1918

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to

H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

## JESSE SYDNEY WYLER.

Death has taken several close friends and active supporters of this journal during the first year of its existence, Todd, Burrows, Ray, and Guilford are all sadly missed; but our immediate staff was first invaded when Jesse S. Wyler of Cincinnati died October 23d, from broncho-pneumonia following influenza.

In the first months of the year, when our organization was incomplete and abstracts of foreign literature were hard to get, his excellent presentation of articles appearing in French could be depended upon and helped materially in meeting the emergency; and the brief practical papers he has contributed to our original department are of the kind that the profession always needs.

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## COMPLETE FILES.

Subscribers whose files for the year 1918 are not complete should at once make application for the numbers required to complete them. Those who

fail to do so will not be able to obtain the issues desired, as comparatively few copies are available for this purpose.

It is generally true that the earlier volumes of a journal are difficult to obtain, and often command more than their original price. As the list of subscribers gradually increases, some of the later subscribers wish to obtain complete sets of the earlier volumes, of which but a smaller number were printed. This is especially the case with a journal like this, containing articles that will be consulted in future years, and a fairly complete review of the world's literature relating to a special subject. As a service both to yourself and the profession in general, keep this first volume.

If you do not care to have the volume bound, tie the numbers together, wrap them in paper to keep out the dust, and write thereon the name of the journal and volume. You will then be ready to supply a demand that will arise; or if later you should desire to bind them, you will have the set complete. It is coming to be recognized that complete

sets of good journals are the most valuable part of any medical library; and journals so tied up and labelled can be consulted, even tho less readily than a bound volume.

### OUR BEGINNING.

In our first number the combination of ophthalmic journals was spoken of, "not as an achievement, but as a beginning—an opportunity." With the first completed volume before us, we can see more exactly what this beginning has been; and the opportunity that begins to open out more widely before us. Some things have been put to the final test of practicability—they have been done. Others have been approached until their early achievement is strongly probable.

To begin with the financial basis; it has been proved that 2,000 ophthalmologists in America were willing to spend ten dollars per year each, to improve the current literature of their special branch of medicine, and to get a better command of that literature. This seems very moderate as an annual business expenditure; but a year ago nobody knew that so many oculists would make it. From the subscriptions paid in for the first volume every proper expense chargeable thereto has been met; and by a sacrifice on the part of the workers for the journal of a return they can henceforward expect, a good working balance has been established that will give the journal in the future every advantage of cash discounts and advance purchases.

When the combination of journals was proposed, one of our prominent ophthalmologists of large business experience wrote: "I have had a little experience in being the 'angel' for a medical journal, and I feel confident that the plan as outlined, with that price will not succeed." By the close of the year those who put their cash and their property into this undertaking, have received convincing evidence that they did not give their money away or waste it; but made a sensible investment that is yielding a reasonable rate of interest.

This achievement takes added significance because of conditions in 1918, when most journals cut down their size, and some increased their price. Our most important competitor diminished its size to 48 pages and raised its price from \$7.50 to \$10.00 per year; and its course was fully justified by existing conditions. But the AMERICAN JOURNAL OF OPHTHALMOLOGY has come out with over one hundred printed pages each month (pages 50 to 90 per cent. larger than those of its contemporaries), and less than ten per cent given over to advertising.

In addition to its numbered pages, it has printed 19 insert plates, of a quality heretofore exceptional among American medical journals. Among these were seven of the eight plates printed in colors, that have appeared in that time in the ophthalmic publications of America.

The JOURNAL has not been placed in the hands of subscribers on the 15th of each month, as we wished. But consider some of the obstacles which have made it impossible for some of the biggest business enterprises to get printing done at the proper time: A great shortage in skilled labor for the manufacture of paper and in printing offices. Five coalless days, as our first number was ready for the press. Two printers' strikes, that caused periodicals like the Literary Digest and Collier's Weekly to omit issues; and delay in second class mails, so that the October number mailed in Chicago, October 26th, was received in Denver November 5th. Then with 43% of the Editorial Staff, and 40% of the collaborators in military service, it is evident that the full resources of our JOURNAL are not yet developed.

To point out what has been done under these circumstances sounds like boasting; but we only mention facts that we want every subscriber to the JOURNAL to know and understand. What has been done was made possible by the coöperation of 2,000 professional colleagues. There are in America 4,000 professed oculists, who ought to take this journal, who do not yet do so; nor do they take any other jour-



nal relating to their specialty. Their good and the good of their patients demands that they should have it. They can be induced to take it by active propaganda on the part of our present subscribers. When they do, the service that all subscribers will receive from the AMERICAN JOURNAL OF OPHTHALMOLOGY will be enormously improved and extended. Let us go forward.

E. J.

### THE OPHTHALMIC YEAR BOOK.

When the plan for combining ophthalmic journals was carried into effect, several workers in the literature of ophthalmology expressed regret that the year-book was to be given up. But it has not been given up. The digest of the literature published from month to month is as complete as that of any preceding year, published in the year book. It is not spread on as many pages, but, owing to the greater number of words to the page, it contains as much as the largest volume of the year book that has preceded it.

In view of the difficulties attending the gathering of the world's literature during a world war, this is a worthy achievement. It is the best possible guarantee that with the return of normal conditions this review of the ophthalmic literature of the world will keep the lead it now has; and will give to English reading ophthalmologists, better resources and facilities for study and literary work, than they have had before.

As will be seen on inspection the digest of the literature has been paged and printed for binding in an independent volume. In this number we publish the bibliography for it, arranged alphabetically by author's names, so that if one does not remember the exact title for it, the author's name will quickly indicate in which paper his writings on any particular subject are to be found. In addition, the subject index following, will indicate where all the important writings on a particular subject are alluded to, even tho the allusions to them do not appear in the titles of the papers.

There have been numerous inquiries about the sources of articles mentioned in the digest; and, publishing the "Digest" from month to month, it was not reasonable to wait to the end of the year for the references to the papers mentioned. These papers had all been noticed in "Ophthalmic Literature" in the months preceding their mention in the "Digest." But to find them there generally required looking over the lists of several months. Several readers and collaborators have suggested the better way of placing the bibliography at the beginning of each section of the digest. And with next month this plan will be adopted.

In addition to bibliography and index we publish this month the title page and table of contents that are required to make this reference book complete and ready for binding. It will make a respectable volume for the one year, but it is possible that some may prefer to wait and have two volumes bound together. The size of page can be cut to that of preceding volumes of the year-book, or it can be kept the same size as the JOURNAL.

Some may prefer to bind the "Year Book" part with the bulk of the journal. If this is done it will be found much more convenient for reference if the digest of the literature is separated from the other pages, and all the "digest" brought together in the latter part of the volume. The volume will then be arranged thus: Title page, contents and index for the journal, bulk of journal, pp. 1 to 880. Title page contents, etc., for year book, digest of the literature, pp. i to viii; bibliography and index, pp. 1 to 297.

Such a reference book is worth keeping. The number of ophthalmologists who can appreciate it, and use it to advantage, will increase from year to year; and of such reference books, a complete set is more valuable than scattered volumes.

E. J.

### COLLEAGUES RETURNING TO CIVIL PRACTICE.

Now that the problems of the War are practically settled, by the collapse

of the German war machine and the signing of the armistice, it is necessary more than ever to turn our attention to post-war problems. Among these is the question of physicians now in the service returning to civil life. Altho some of these men have been able to keep their practices more or less intact by means of associates or assistants, the great majority took no thought of the future, but closed their offices, gladly giving all they had to their country.

While those of us who were compelled for various reasons to stay at home have done what we could for them in caring for their patients, in the very nature of things their practices have become more or less scattered, and they are confronted with the task of building them up again. For them to let each of their patients know by card or otherwise would be an expensive and often inefficient method.

Altho the face of the profession is steadily set against advertising, it would seem no more than just to allow these men to insert in the daily papers a simple statement that they have resumed the practice of medicine at such and such an address, the same to run for a limited time, say one month. Or as an alternative, the County Medical Society might request the daily paper to run a column devoted to returning physicians. Such a procedure could in no way be construed as a letting down of the bars against unprofessional advertising.

C. L.

### BOOK NOTICES

**THE AMERICAN ENCYCLOPEDIA AND DICTIONARY OF OPHTHALMOLOGY**, Edited by Lieut. Col. **Casey A. Wood**, M. C., U. S. A., M. D., C. M., D. C. L., Assisted by a Large Staff of Collaborators. Fully Illustrated. Volume XIII. Phonoscope to Protozoic Disease of the Lids. Chicago, Cleveland Press. 1918.

Volume XIII of this monumental book has appeared. The subjects considered are from Phonoscope to Protozoic Disease of the Lids. The larger

articles and those of special importance are those on the Phorometer by G. H. Price, taking 43 pages, in which the various methods and instruments used for measuring muscle deviations are freely described. Then we come to an exhaustive article taking up most of the Book, of 494 pages by Charles Sheard, which indeed will bear close study not only by the preparatory student, but as well by the practitioner. For it is really a fact that most of us have acquired the little knowledge we may have of physiologic optics, mainly by a sort of induction process obtained from the practice of measuring the refraction and by the prescription of lenses, and this almost entirely in cases of deviation from the normal.

Few practitioners indeed know much about the passage of the light into the eye or the dioptries of the eye. Some of us are acquainted with the practical functions of the retina and all of us with the interpretation and appreciation of the outer world thru the sense of sight. Certain it is that in no case do we see the thing itself. We are conscious only of a certain sense impression received from it and the mechanics of focusing these sensations on the retina, and the mental interpretation are all that we are really sure of.

The transition steps of the electrical, chemical and mechanical stimulation of the retina and the physiology, from the retina to the mental receptive centers, are even yet problems engaging the attention of the physiologists and psychologists. The anatomy, however, is well known.

The study of physiologic optics is not very complicated. Very moderate knowledge of algebra and geometry suffices for the reading of all its formulas; and once, started with its study, there is a certain amount of pleasure in following out the laws of light, its refraction, diffraction and reflection. A syllabus of this subject is impossible in this brief review. It must be studied in the original.

A very readable article is one of 29 pages on the ocular relations of pituitary disease by Emory Hill. Likewise of decided interest is the sketch from

the ancient work of Pliny, of his writings having to do with the eye and its treatment. This has been written by T. H. Shastid, and occupies 27 pages.

In addition to the Section on Artificial Eyes in Volume I, which was written in 1913, we find, under the title of Ocular Prothesis, 11 pages, probably by the managing editor. A good deal of this has to do with the war wounds of the eye, requiring special protheses. Particular attention is given to the work of Valois and Rouveix in restoration of the socket, mechanical devices and the new form of elastic rubber base for the artificial eye. This is more freely noted in our review of Valois's Book on the One-Eyed of the War.

It is understood that the Encyclopedias is now being translated into Spanish.

H. V. W.

**NISTAGMO OCULAR.** Enrique Dameno. 8vo, 190 pages. Cordoba and Buenos Aires. 1918.

This is a thesis, presented to the Faculty of Medical Sciences of the National University of Buenos Aires, for the degree of Doctor of Medicine. By it we are again reminded that there is growing up in the great republic of the south temperate zone an important center of medical study and teaching.

The work is a general review of the current knowledge of the subject of ocular nystagmus, arranged in ten chapters. These are entitled: Congenital Nystagmus; Nystagmus and Nutatory Spasm; Miners' Nystagmus; Secondary Nystagmus; Voluntary Nystagmus; Nystagmus with Diseases of the Nervous System; Myoclonic Nystagmus; Nystagmus with Cerebral Tumors; Vestibular Nystagmus; and the Pathogenesis of Nystagmus. There is also an appendix dealing with the Examination of Nystagmus.

Each condition is illustrated by abstracts of cases, some from the author's own observations, some from the literature. The account of the pathogenesis briefly reviews the various hypotheses that have been put forward; and

the more important experimental work done to throw light on this subject.

The makeup of this volume is attractive, but strikes one who has felt the pinch of restricted paper supply as extravagant. It uses the same amount of paper as two numbers of the *AMERICAN JOURNAL OF OPHTHALMOLOGY*, for a thesis that would be printed on less than 40 pages of this journal. This matter of buying or storing unneeded paper grows in importance as one tries to accumulate a medical library.—E. J.

## EQUILIBRIUM AND VERTIGO.

By Isaac H. Jones, Major M. R. C., U. S. Army. With an Analysis of Pathologic Cases by Lewis Fisher, M. D., Philadelphia. Adopted as Standard for Medical Division, Signal Corps, Aviation Section, by Surgeon General, and Chief Signal Officer, U. S. Army. Octavo 444 pages, with 130 illustrations. Philadelphia and London. J. B. Lippincott Company. 1918.

It almost seems that a new specialty has arisen, that of Neuro-Otology. At first sight, apparently complicated and at any rate, so intimately connected with Otology Neurology and Ophthalmology, that the head Surgeon must make himself proficient in these new methods of examination. It seems that we must add to the commonly accepted five senses, the sixth, muscle, joint and splanchnic sense; by which the individual performs coordinate acts automatically and unconsciously and the seventh sense, the kinetic-static, which is presided over by the equilibratory portion of the ear, the labyrinth; and is a separate sense as truly as that of hearing or sight.

Perfect equilibrium is accomplished thru an harmonious coöperation of the sight, muscle sense and most particularly of the kinetic-static sense; and they are intimately connected.

Vertigo is always due to disturbance of the labyrinth, due to a direct attack of this apparatus whether the primary cause be refraction, indigestion, Bright's disease or what not. Vertigo may be caused by—Involvement of the



ear mechanism; (1) by a lesion in the ear itself; (2) by a lesion affecting the intracranial pathways from the ear; (3) by ocular disturbance, either thru the eye muscle nuclei or thru association fibers, from the cuneus to the cortical terminus of the fibers from the ear in the posterior portion of the first temporal convolution; (4) by cardiovascular disturbance and (5) by toxemias from any organ or part of the body.

In any case, the first thing to be done is to examine the ear mechanism, where if the functions are normal, we narrow the diagnosis down to; (1) a purely functional neurosis, (2) an ocular disturbance or to an evanescent toxemia the course of which must then be looked for.

A number of pages are given to *The Ear and Aviation*, to *The Ear and Seasickness*; and what is particularly important to the oculist is *The Ear in Syphilis*; for it shows that the latter has a direct affinity for the 8th nerve, and that tests of this give a valuable index of the central nervous system of much simpler application than the Wassermann tests of the spinal fluid.

*The Ear and the Neurologist* are briefly discussed. Again of interest to the ophthalmologist is the study of the tests in ocular palsies where favorable prognoses may be given if it is found that the turning and douching test give proper responses. Spontaneous nystagmus, studied by these tests, provides a means of approach in determining its cause or the site of the lesion. Naturally the ear surgeon, or as most of us are "head surgeon," is the man to carry out these examinations.

An exhaustive study of the physiology and anatomy of cerebral localization is given. The study of nystagmus, of the past pointing, and of the falling tests by the turning chair and by douching, is exhaustively described. Pathologic consideration of the cases is gone into in detail. A very complete index is appended. The book is well printed, freely illustrated and well bound.

The text is more lucid and possibly more instructive than other books on the same subject, and it has been

brought well down to date and systematized. From an oculist's and printer's standpoint, however, we would prefer not to have had it on glazed paper, except as far as the phototint illustrations go.

Certainly this contribution to literature is of great value to the ophthalmologist, and this form of examination should be in constant use for the class of cases indicated.

H. V. W.

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**THE TWIN IDEALS** An Educated Commonwealth. Sir **James W. Barrett**, K. B. E., C. B. C. M. G., M. D., M. S., F. R. C. S. (Eng.) Temporary Lieut. Col. R. A. M. C. Two volumes, 8vo, pp. 544 and 524. Illustrated with Maps and Diagrams. H. K. Lewis and Co., Ltd., 136 Gower St., London, W. C. I. 1918. Price 25s. net.

While there is little in these two volumes which has to do with ophthalmology, yet the fact that one of our well known confreres is the author, and an authority on political economy, necessitates a notice in our JOURNAL.

It may seem strange to us that an eye surgeon should delve into this subject; and take such a prominent part in the political management of the commonwealth as is done in other countries. The medical men of America do not often devote themselves to such public interests; their activities are absorbed largely in their medical professional work. Indeed we seem to be too busy with the practice of medicine, particularly those who have become more eminent or widely known; and politics is in disfavor with the profession in America.

In other lands, medical men sit in the Legislatures, in the City Councils, in the State, Provincial and General Legislatures to a greater extent than in the United States; and they seem to suffer no loss of prestige in a medical way therefrom. It is certainly different here, for when a Doctor goes into politics, his career as a medical man is usually ended.

The essays, memorandums, articles and letters, republished in these two volumes, were originally put in print in the various newspapers, magazines and government reports of Australia. Many references thruout the book are made to the menace of Germany, as well as to certain economic improvements in vogue there. Flattering references for the most part are given to America, to our writers, particularly to Lincoln and to our public institutions, some of our universities and to the American Medical Association.

The description of the development of Australian institutions gives a valuable insight into the evidences of the mode of thought in that country, and the changes of society; and offers many suggestions as to the building up of that Commonwealth upon eternal principles.

Of special ophthalmic notes, we find some on trachoma in the State of Victoria, and the influence of venereal disease on the eye, which is touched upon in a number of the articles.

The work is well written in a popular style, and the author is to be complimented upon its publication.

H. V. W.

## BIOGRAPHIC SKETCHES.

THOMAS HALL SHASTID.

STEPHAN BERNHEIMER, of Vienna, died of chronic nephritis March 19, 1917. Born at Trieste in 1861, he was a nephew of the famous ophthalmologist, Brettauer. He studied medicine in Vienna, and, while still a student, published an original work entitled "Optic Nerve Fibers in the Human Retina," as well as a translation from the Italian of Bizzozzero's "Handbook of Clinical Microscopy." He received the medical degree at Vienna in 1885.

From 1885 to 1890 he was first assistant to Otto Becker in Heidelberg, and, in 1888, began to practice in that city. After Becker's death, he remained in Heidelberg for one year, then removed to Vienna, where he was first assistant to Ernest Fuchs. In 1900 he removed to Innsbruck, in order to accept the full

professorship of ophthalmology at that place. After fifteen years he received the full professorship at Vienna.

Bernheimer's writings, which are numerous, relate almost exclusively to congenital ocular anomalies, and to experimental histologic studies on the nervous mechanism of the eye.

PAUL GUILFORD, of Chicago, while at his home in La Grange caring for his wife and four children who were seriously ill with influenza, himself fell a victim to the disease, which quickly developed into the particularly virulent type of pneumonia so prevalent in the present epidemic. The fatal termination came October 19th, only three days after the onset of acute symptoms.

Dr. Guilford was born in Lebanon, Pa., in 1870. He attended the public schools of that city and then began the study of medicine, graduating from the medical department of the University of Pennsylvania in 1891. The following year was spent as an interne in the Philadelphia Orthopedic Hospital and Infirmary for Nervous Diseases, where he enjoyed the tutelage of the late Dr. Weir Mitchell. Having decided to devote his attention to ophthalmology, he served a full term of one year in the Wills Eye Hospital. In 1894 he took up his residence in Chicago and began active practice, being associated for some time with Dr. S. J. Jones in the St. Luke's Hospital Dispensary.

In 1900 he entered into a business partnership with Dr. Frank Allport, and this association continued unbroken for eighteen years, up to the time of his death.

Dr. Guilford was by nature of a rather retiring disposition, and always bore himself with a quiet, modest dignity; his honest, upright character, combined with the qualities of comradeship, had endeared him to the hearts of all his colleagues.

In 1914 he was elected Secretary of the Chicago Ophthalmological Society, and because of his faithful devotion to the duties of this office, he was twice reelected to the same position, and in 1917 the Society further honored him by electing him President.

Dr. Guilford found time, out of the busy routine of an extensive practice, to make some valuable contributions to ophthalmic literature. He edited a section of Wood's "System of Ophthalmic Operations," and was one of the collaborators of "The American Ency-

EWALD HERING, one of the most famous of modern ophthalmologists, passed from his labors on January 26 of this year. Born August 5, 1834, in the parsonage at Alt-Gersdorf (Lausitz), Kingdom of Saxony, he studied at Leipsic, where he was chiefly influ-



Paul Guilford, 1870-1918

clopedia of Ophthalmology." He was Assistant Oculist and Aurist for the Chicago and Northwestern Railroad, for the Chicago Orphan Asylum, and a member of the ophthalmological staff of St. Luke's Hospital. He was married in 1906 to Miss Ethel Hamline. His widow and four children survive him.

enced by Carus, Fechner and Weber. It seems, however, to have been due to the influence of his friend, Coccius, that he turned his attention especially to the eye. To Coccius, in consequence, he later dedicated his work, "Teaching of Binocular Vision."

For a time Hering practiced in Leipsic, but, in 1865, was called to the chair



of physiology and medical physics at the Military Academy in Vienna. In 1870 he was called to the like chair in Prague, where he labored with great success for twenty-five years. In 1895 he was called to Leipsic, where he worked incessantly until his death.

Besides the writings already mentioned, Hering published almost innumerable articles on binocular vision, the sensibility of the retina, color vision, the rotation of the eye, the form of the horopter, the laws of binocular depth-perception, etc., as well as a very long list of articles on the physiology of other organs than the eye. The most of his writings appear in "Wiener Akademische Sitzungsberichte," "Poggendorff's Annalen," "Archiv f. Anatomie und Physiologie," "Archiv f. Mikroskopische Anatomie" and Graefe's "Archiv f. Ophthalmologie."

Dr. NICOLAI, well known ophthalmologist of Berlin, was instantly killed on April 13 by a piece of flying shell. Born at Greifswald in 1868, he received his medical degree at the Kaiser Wilhelm Academy at Berlin. For a time he was assistant in general surgery at the clinic of Professor Frölich. Turning his attention to the eye, however, he became a pupil of A. C. Graefe. Settling as ophthalmologist in Berlin, he soon had a very large practice. He was ophthalmologist to the Queen Augusta Grenadier Guard and to the Eye-station in the Garrison Hospital.

FERGUS MENTEITH OGILVIE, a well-known Oxford, England, ophthalmologist, died at his home in Oxford, from pneumonia on January 17. Born in 1860, he studied medicine at Cambridge University and St. George's Hospital, London. At the latter institution he was assistant in ophthalmology. He also studied ophthalmology at Moorfields and the Royal Westminster Ophthalmic Hospital. He began the practice of ophthalmology at Oxford, forming a partnership with Mr. R. W. Doyne. A few years later he retired from practice, and then was made consulting surgeon to the Oxford Eye Hospital. His mother was the founder

of the well-known "Margaret Ogilvie Readership in Ophthalmology."

EDUARD RAEHLMANN, professor of ophthalmology at Weimar, died recently at the age of seventy. He was born March 19, 1848, at Ibbenbüren, Westphalia, and studied at Würzburg, Halle, Strassburg, Paris and London. At Halle he was first assistant to Alfred Graefe, and, in Strassburg, to Laqueur. He received his medical degree in 1872, from 1875 to 1879 was privatdocent in Strassburg, and in 1879 was made ordinarius in ophthalmology at Dorpat. In 1900 he removed to Munich, and just a little later to Weimar, where he was ordinary professor of ophthalmology until his death. He was the first to recommend hyperbolic lenses for keratoconus and irregular astigmatism. His writings, however, which are numerous, chiefly relate to color blindness and the physiology of color vision.

KENNETH MACKENZIE SCOTT, well known as professor of ophthalmology for many years at the Egyptian Medical School, Cairo, died in London, suddenly, on February 19. Born at Morton, Bingley, Yorkshire, he received his training in the liberal arts at the Edinburgh Academy, Edinburgh University, and King's College, London. He received the degree of bachelor in medicine at Edinburgh University in 1887. He was ophthalmic surgeon to the Kasr-el-Aini Hospital, Cairo, from 1889 to 1899. He was also one of the organizers of the Cairo Blind School. Removing to London, he became assistant ophthalmic surgeon to the West London Hospital, and Consulting Ophthalmic Surgeon to St. Mary's Hospital for Women and Children. His writings are mostly on refraction and lid operations.

DR. SULZER, of Paris, one of the editors of the *Annales d'Oculistique*, died February 9 from angina pectoris. Born at Winterthur, Switzerland, in 1858, he studied at Zurich, Strassburg, and Utrecht. He settled at first in the Island of Java, but in 1889 removed to Paris, thence to Geneva, and, eventually, to Paris again. In 1914, tho 56 years of age, he entered the army of

the allies as ophthalmic surgeon, and labored in that capacity until his ever-increasing cardiac difficulty compelled his return to Paris. The writer desires to acknowledge Dr. Sulzer's very great and ungrudging assistance in the gathering of biographic data about deceased French and Swiss ophthalmologists, and also about various French ophthalmic laws and judicial decisions. Dr. Sulzer's list of writings is a long one. Perhaps his most important contributions were the following, all in the "Encyclopédie Française d'Ophtalmologie:" "Détermination de la Tension de l'Oeil. Ophtalmotonométrie" (II, p. 60); "Ophtalmométrie" (III, p. 59); "Les Amétropies Focales" (III, p. 287); "La Presbyopie" (III, p. 1127).

CHARLES HERBERT WILLIAMS, famous American ophthalmologist, died at his home in Cambridge, Mass., June 9, 1918, survived by his widow and two children. Born at Boston, April 19, 1850, he was a son of the still more famous Henry Willard Williams, the first in America to deliver a course of lectures on the eye, and of Elizabeth Dewey Williams. His bachelor of arts was received at Harvard University in 1871, his medical degree in 1874.

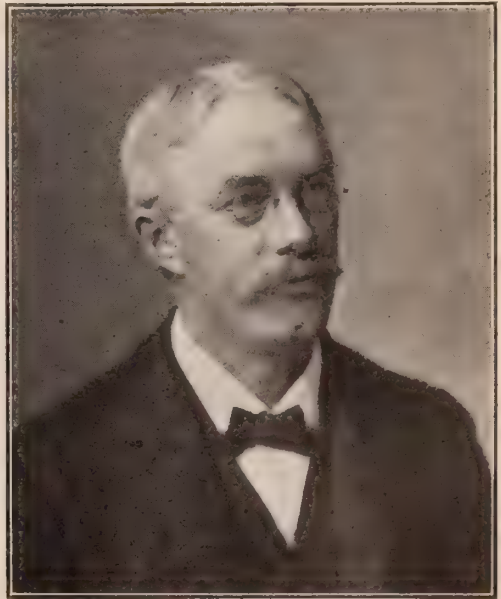
After a number of years devoted to the study of ophthalmology in European centers, he returned to Boston, where he practiced for a time with his father. He married, on October 1, 1884, Caroline Ellis Fisher, afterward removing to Chicago. In 1895, he returned to Boston, where he practiced with his brother, Dr. E. R. Williams.

Dr. Charles H. Williams was one of the earliest investigators of color blindness in this country and an excellent writer on that subject, as well as on errors of refraction. He will, however, be especially remembered as the first to extract a foreign body from the eye by the aid of a Roentgen picture. The picture, we may add, was, in the case in question, made by yet another brother, Dr. F. H. Williams.

Dr. Charles H. Williams was ophthalmologist to the Massachusetts Eye and Ear Infirmary and to the Boston

City Hospital, a member of the Chicago and of the American Ophthalmological Societies.

Dr. Williams, like his father, was a large, tall man, fair complexioned, gray of eye and hair, mustached, quiet and reserved in manner. He was markedly fond of animals, dogs, cats, and horses in particular. He was a Republican in politics, a member of the Boston Common Council, a trustee of the Town-



Charles Herbert Williams, 1850-1918

ship High School, and in many other ways active in civic affairs.

The following passage about Dr. Williams is from the "Boston Evening Transcript": "By the death of Dr. Charles H. Williams his friends have lost a loyal, true and devoted companion, one whom it was a joy to meet, who was always ready to see the best in people, free from envy or any small or narrow point of view. His place in their hearts can never be filled. The community has lost a faithful, unselfish citizen, never seeking his own gain, but glad to contribute his skill and aid in any direction needed, giving the world the benefit of his many inventions, never thinking of profit or fame.



# NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. As these columns go to press on the 30th of the month contributors should send in their items by the 25th. The following gentlemen have consented to supply the News Item Editor with the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered, as well as all foreign countries. Volunteers are therefore needed and it is hoped that they will respond promptly to this call.

## DEATHS.

Mr. Brudenell Carter, of London, died October 30th, aged 90 years.

George Cerny, St. Louis, Mo., aged 44, died September 13th, from pneumonia.

William Francis Conway, Albany, New York, aged 31, died November 1st, from influenza.

Lieut. Carl Calvin Culver, M. C., Burlington, Kansas, died in Camp Grant about October 6th, from pneumonia following influenza.

Charles Huff Davis, Knoxville, Kentucky, aged 57, died at his home, October 21st, from pneumonia following influenza.

Paul Guilford, Chicago and La Grange, Illinois, aged 48, died at his home, October 20th, from pneumonia following influenza.

Frederick Carrol Heath, Indianapolis, died October 16th, aged 61.

Roy-Richard Longino, Fort Stockton, Texas, aged 34, died at his home recently, from influenza.

David Webster Meyer, Brooklyn, aged 47, died at his home, October 24th, from pneumonia.

Lieut. Timothy Joseph Moran, M. C., U. S. Army, from Pittsburgh, died in Camp Greenleaf, Fort Oglethorpe, Georgia, October 17th, aged 37.

Joseph White Humphrey Porter, Caribou, Maine, aged 40, died at his home, about October 31st, from pneumonia.

Lieut. George Rupp Pretz, M. C., U. S. Army, of Lebanon, Pennsylvania, aged 38, died in Syracuse while on duty, September 30th, from influenza.

John Ranly, Cincinnati, aged 42, died at his home October 13th, from pneumonia following influenza.

James H. Reynolds, Louisa, Kentucky, aged 48, died at his home, October 9th, from pneumonia following influenza.

Charles R. Schoemaker, Baltimore, aged 46, died at his home, October 20th, from influenza.

William Williamson, San Diego, died in Los Angeles, October 19th, from pneumonia.

Jesse Sidney Wyler, Cincinnati, aged 39, died at his home in Avondale, October 23rd, from pneumonia following influenza.

## PERSONAL.

Dr. L. Webster Fox, of Philadelphia, has been elected trustee of the Policlinic Hospital.

Dr. Luther C. Peter has been elected secretary of the American Academy of Ophthalmology and Oto-Laryngology.

Dr. A. Vogt, of Aarau, is appointed to occupy the chair of ophthalmology in the University at Bale. Dr. Vogt is well known for his work on ophthalmoscopy with red-free light.

Following the meeting of the Fifth National Medical Congress of Mexico, a National Committee for the Prevention of Blindness has been founded, with Dr. J. Joaquin Izquierdo as secretary.

Dr. Wesley H. Peck, of Chicago, chairman of the Eye, Ear, Nose and Throat Section of the Illinois State Medical Society, is desirous of hearing from as many ophthalmologists throughout the state as possible, who will present papers to be read at the next annual meeting of the society. This meeting will be held at Peoria next May.

Dr. S. Lewis Ziegler, of Philadelphia, has been appointed chairman of the Nursing Survey Committee of the Southeastern Pennsylvania chapter of the American Red Cross. The purpose of this committee is active co-operation with the Surgeon General in securing the prompt registration of graduate and pupil nurses—trained attendants and nurses' helpers.

## MILITARY NOTES.

Dr. Major H. Worthington, of Chicago, has been assigned to duty at Camp Custer, Michigan.

Dr. George T. Jordan, of Chicago, has received a commission as Captain, M. C., U. S. A., and assigned to Camp Grant, Illinois.

Dr. F. H. Verhoeff, of Boston, Mass., has accepted a commission as major in the Medical Reserve Corps, but has not been assigned to duty.

Dr. D. G. Monaghan, of Denver, has accepted a commission in the M. C. with the rank of Captain, and has been assigned for duty at Camp Lewis.

Dr. Frank Brawley, of Chicago, has been given a captain's commission and assigned to the Air Service Division at Mineola.



Dr. Hans Barkan has accepted a captaincy in the M. R. C., and is stationed at the Base Hospital, Camp Kearney, near San Diego, California.

Dr. H. V. Würdemann, of Seattle, has accepted a commission in the M. C. with rank of Captain and has been assigned for duty at Camp Lewis.

Two more eye, ear, nose and throat men have entered service from Spokane, Washington, namely: Dr. Scott B. Hopkins and Dr. Frank W. Hilscher, both as captains.

Capt. W. McL. Ayres, M. R. C., of Cincinnati, who is attached to Base Hospital No. 110, is now "over there," probably in France. He served some time in Camp Sevier, S. C.

#### MISCELLANEOUS.

The physicians of California secured the defeat of the health insurance measure by a large majority.

Among 60,000 applicants for the Volunteer Medical Service Corps, 305 have applied as ophthalmologists, and 1,845 as eye, ear, nose and throat specialists.

As the governmental demand for platinum in the making of explosives, etc., has been tremendously decreased by the curtailed war program, it is requested that no further scrap platinum be tendered to the Government.

The National Committee for the Prevention of Blindness held its annual meeting November 26th, at the New York Academy of Medicine. Lieut.-Col. James Bordley, Jr., M. C., Baltimore, delivered an address on "The Government and Red Cross Work for Blinded Soldiers."

Hemeralopia occurred in 7.52 per cent of 2,700 Belgian soldiers examined by Danis. He believed that in many cases it is merely the revealing under army conditions of an old unsuspected tendency to night blindness, brought out by the physical and emotional stress of the war.

A Christmas shop has been opened in Chicago, where the proceeds from the sale of articles will be sent to the Permanent Blind Relief War Fund. Under the direction of the French Government this fund is maintaining five institutions for the rehabilitation of totally blinded soldiers by teaching them practical work by which they may be able to earn a living.

The influenza in San Francisco has produced a number of cases of infection of the conjunctiva and ulcerations of the cornea. This has been noticed in the Stanford Clinic and in private practice. The corneal ulcers have responded promptly to zinc sulphat, 20 per cent applied directly to the ulcer with a cotton tipped probe, and the use of ½ per cent solution zinc sulphat by the patient at home. The conjunctival cases have responded to the zinc sulphat and cyanid of mercury, 1-5000 as a wash.

Because of the fact that individuals who ate liver daily were seen to have escaped

night-blindness, von Stenitzer and Schröder have been using cooked liver in the treatment of that affection. Thirty-four patients with hemeralopia were subjected to the exclusive diet. Of this number thirty made complete recoveries and the other four were benefited. The duration of treatment varied from 3 to 78 days. But at the same time twenty-four controls with night blindness received no treatment, yet twenty recovered completely and three improved.

Artificial eyes of the best quality have been made in France. But even there the cheaper grades were imported from Germany. Eunice Tietjens states in the Chicago *Daily News* that before the war a certain number of women were employed in this work, but the greater part was done by men. Now an appeal is being made in France to young women to take up the manufacture of glass eyes as a profession. The apprenticeship is long, four years at least, and the cost was before the war \$600 or \$800, so that the ordinary working family was not, as a rule, able to afford this trade for the children. But as soon as the apprentice has learned a part of the work she can begin to earn while continuing her course. At the end of two years her salary will be that of an average woman employe. And when she really learns the trade she can make an excellent salary.

According to Bulletin No. 18, Department of Commerce, Bureau of Standards:

By this Bureau, in co-operation with the Inspection Division of the Ordnance Department of the Army, studies were made to the end of devising tests for the optical parts of the 37 mm. gun-sight telescope. A sample panoramic machine gun-sight and an officers' machine gun periscope were submitted for test. A sample periscopic alidade copied from a French instrument was submitted for an examination of the optical parts and for opinion on certain deviations from the specifications desirable in order to permit the instrument to be submitted for quantity production.

At the request of the Medical Supply Depot, the Bureau devised a suitable set of condenser lenses to be used with an acetylene flame for the microscopic work of the Field Medical Service. Nine inspectors of the Signal Corps were detailed to the Bureau of Standards for a course of three weeks' instruction in connection with the design and testing of binoculars. These men will carry on the factory inspection of binoculars, using the Bureau's methods. Routine tests of 113 field glasses were carried on for the Signal Corps during the month of October.

During the month of October 3,020 pounds of inspected *optical glass* were shipped, representing 5 melts of light barium crown, 7 of barium flint and 9 of medium flint. Special reports have been prepared on the *annealing of borosilicate glass* for manufacture of optical instruments, and on the annealing of optical glasses for the Navy Department.

# OPHTHALMIC LITERATURE

Under this head continuing the "Index of Ophthalmology" heretofore published in **Ophthalmic Literature** will be found the subjects of all published papers received during the last month, that bear to an important extent upon ophthalmology. The subject is indicated rather than the exact title given by the author. Where the original title has been in a foreign language it is translated into English. The journal in which the paper is published will indicate the language of the original.

The names of the different journals are indicated by abbreviations which generally correspond to those used by the **Index Medicus**, the **Journal of the American Medical Association**, and the **British Journal of Ophthalmology**. We will from time to time publish the list of ophthalmic journals, with the abbreviations used for each. Often a single letter discriminates between journals published in different languages. Thus "Arch. of Ophth." refers to the Archives of Ophthalmology, published in English; "Arch. d'Opht.," indicates the French Archives d'Ophthalmologie; "Arch. de Oftal." refers to the Archivos de Oftalmologia Hispano-Americanos, while "Arch. di Ottal." indicates the Italian Archivio di Ottalmologia.

In this index of the literature the different subjects are grouped under appropriate heads; so that all papers bearing on the same, or closely related subjects, will be found in one group. The succession of the groups is the same from month to month, and identical with that of the Digest of the Literature. Where a paper clearly refers to two subjects that belong in different groups, it will be noticed in both groups.

Each reference begins with the name of the author in heavyface type. This is followed by the subject of his paper. Then in brackets a number with (ill.) indicates the number of illustrations, or a number with (pl.) the number of plates illustrating the article, (col. pl.) indicates colored plates. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that the paper was read before some society and gave rise to a discussion which is published with it.

The "repeated titles" may render accessible the essential part of a paper, the original of which could not be consulted. These give (in brackets) after the author's name the volume and page of this department of "Ophthalmic Literature" where the title of the paper will be found; and then the journal, volume, and page where the translation or abstract is published.

It is desired to notice every paper as soon as possible after it is published. Readers will confer a favor by sending titles they notice have been omitted, with journal and page of publication; and of their own papers, sending either a copy of the journal in which each appeared, or a reprint. These should be sent as soon as possible to 318 Majestic Building, Denver, Colorado.

## DIAGNOSIS.

- Bourdier, F.** Determination of Visual Acuity. Arch. d'Opht., v. 36, p. 294.  
**Robertson, C. M.** Examination of Men Entering Aviation Service. Jour. Amer. Med. Assn., v. 71, p. 813.  
**Trantas.** Ophthalmoscopy of the Corneal-iridic Angle. (5 ill.) Arch. d'Opht., v. 36, p. 257.  
**Uribe-Troncoso, M.** Wider Use of the Tonometer. Amer. Jour. Ophth., v. 1, p. 799.

## OPERATIONS.

- Zarzycki.** Ocular Osteoplasty. Paris Chirurg., 1917, v. 9, p. 690.

## REFRACTION.

- Charles, J. W.** Ocular Headache. Jour. Amer. Med. Assn., v. 71, p. 1711.  
 Repeated Titles. **Steiger.** (v. 1, p. 541.) Amer. Jour. Ophth., v. 1, p. 738.

## OCULAR MOVEMENTS.

- Gardiner, E. J.** Incipient Squint. Illinois Med. Jour., v. 34, p. 277.  
**Lyster, T. C.** Aviation Service of Medical Department of the Army. Ann. of Otol., Rhin. and Laryngol., v. 27, p. 851.  
**O'Connor, R.** Operations for Squint. Amer. Jour. Ophth., v. 1, p. 806.

- Vagliasindi.** Pathology and Physiology of Binocular Diplopia. (23 ill.) Arch. di Ottal., v. 24, p. 379.  
**Wyler, J. S.** Paralytic Strabismus Cured by Simple Operative Procedure. (1 ill.) Amer. Jour. Ophth., v. 1, p. 793.

## CONJUNCTIVA.

- Alexander, G. F.** Operation for Pterygium. Lancet, Oct. 12, 1918, pp. 488, 493.  
**Brose, L. D.** Pneumococcus Infection of Eye, Ear, Nose and Throat. South. Med. Jour., 1918, v. 11, p. 701.  
**Fernandez, J. S.** Extreme Photophobia. Cron. Med. Quir de la Habana, v. 44, p. 256.  
 Hospital for Ophthalmia Neonatorum. Brit. Jour. Ophth., v. 2, p. 574.  
**Kiilerich.** Iodides in Conjunctivitis. Ugesk. for Laeger., 1918, p. 1587.  
**Richardson, B.** External Eye Diseases of Elementary School Children. Brit. Jour. Child. Dis., v. 15, p. 201.  
**Solarès.** Treatment of Trachomatous Conjunctivitis. Arch. d'Opht., v. 36, p. 228.

## CORNEA AND SCLERA.

- Griscom, J. M.** Regeneration of Cornea Partially Lost During Gonorrheal Ophthalmia. (Dis.) Amer. Jour. Ophth., v. 1, p. 735.



- Tillot.** Ulceration of Cornea Treated with Dionin. *Amer. Jour. Ophth.*, v. 1, p. 796.
- Tooke, F.** Pathologic Manifestations of Tuberculous Kerato-iritis. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 730.

#### ANTERIOR CHAMBER AND PUPIL.

- Elschnig.** Intraocular Reposition of Iris. *Klin. M. f. Augenh.*, Feb.-March, 1915, p. 186. *Brit. Jour. Ophth.*, v. 2, p. 577.
- Fromaget, C., and H.** Functional Anisocoria. *Arch. d'Ophth.*, v. 36, p. 277.
- Lutz, A.** Unilateral Inheritance, Especially of Eyes; Cases of Anisocoria. *Arch. of Ophth.*, v. 47, p. 587.

#### UVEAL TRACT.

- Fraser.** Iritis. *Canadian Med. Assn. Jour.*, v. 8, p. 664.
- Peter, L. C.** Probable Intraocular Tuberculosis. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 733.
- Ramsay, A. M.** Treatment of Prolapse of Iris. *Brit. Jour. Ophth.*, v. 2, p. 554.
- Terrien, F.** Meningococcic Suppurative Iridochoroiditis. (2 ill.) *Arch. d'Ophth.*, v. 36, p. 231.

#### GLAUCOMA.

- Brown, E. J.** Unrecognized Chronic Simple Glaucoma. *Amer. Jour. Ophth.*, v. 1, p. 776.
- Byers, W. G.** Studies of Eyeballs Lost After Sclero-corneal Trephining. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 729.
- Lister, A. E. J.** Glaucoma Treated by Sclero-corneal Trephining. *Brit. Jour. Ophth.*, v. 2, p. 561.
- Peter, L. C.** Buphthalmos. *Amer. Jour. Ophth.*, v. 1, p. 732.
- Unusual Case of Glaucoma. *Amer. Jour. Ophth.*, v. 1, p. 734.
- Repeated Titles. **Morax.** (v. 1, p. 542.) *Amer. Jour. Ophth.*, v. 1, p. 736.

#### CRYSTALLINE LENS.

- Axenfeld, T.** External Canthotomy in Cataract Extraction. *Klin. M. f. Augenh.*, v. 54, p. 97. *Brit. Jour. Ophth.*, v. 2, p. 577.
- Berrisford, P. D.** Lens Opacity Following Contusion. *Arch. of Ophth.*, v. 47, p. 616.
- Constantinescu, I.** Advancement of Conjunctiva in Cataract Extraction. *Klin. M. f. Augenh.*, March-April, 1914. *Brit. Jour. Ophth.*, v. 2, p. 577.
- Knapp, A.** Cataract in Retinitis Pigmentosa. *Arch. of Ophth.*, v. 47, p. 612.
- Knapp, P.** Disturbances in Formation of Anterior Chamber After Cataract Extraction. *Klin. M. f. Augenh.*, Jan., 1917. *Brit. Jour. Ophth.*, v. 2, p. 578.
- Srinivaschary, E. V.** Cataract. *Madras Med. Jour.*, 1918, p. 81.
- Verhoeff, F. H.** Microscopic Findings in Coralliform Cataract with Remarks on Congenital Cataract. *Arch. of Ophth.*, v. 47, p. 558.
- Repeated Titles. **Barraquer and Anduyned.** (v. 1, p. 462.) *Brit. Jour. Ophth.*, v. 2, p. 580. **Mulock Houwer** (v. 1, p. 621.) *Brit. Jour. Ophth.*, v. 2, p. 579.

#### VITREOUS.

- Harrison, W. G.** Clinical Observations on Traumatic Intraocular Hemorrhage. *South. Med. Jour.*, v. 11, p. 696.

#### RETINA.

- Dameno, E.** Degeneration of Retina in Adult. *Prensa Med. Argentina*, v. 5, p. 90.
- Ferree, C. E., and Rand, G.** Inertia of Adjustment for Seeing at Different Distances. *Amer. Jour. Ophth.*, v. 1, p. 764.
- Jackson, E.** Permanent Vascular Changes Following Injuries to Eye. (1 pl.) *Amer. Jour. Ophth.*, v. 1, p. 776.
- Night Blindness in War. *Med. Rec.*, v. 94, p. 900.
- Ochoterena, I.** Retina of Horned Frog. *Gaceta de los Hosp.*, v. 1, p. 65. *Abst. Jour. Amer. Med. Assn.*, v. 71, p. 1522.
- Tenner, A. S.** Bacterial Toxin, Cause of Retinal Hemorrhage. *Jour. Amer. Med. Assn.*, v. 71, p. 1650.
- Urrea, F. M.** Regeneration of Retina. (2 ill.) *España Oftal.*, Aug., 1918, p. 125.
- Weekers, L.** Hemeralopia. *Arch. d'Ophth.*, v. 36, p. 203.
- Repeated Titles. **Fuchs.** (v. 1, p. 750.) *Amer. Jour. Ophth.*, v. 1, p. 797. **Suganuma.** (v. 1, p. 390.) *Amer. Jour. Ophth.*, v. 1, p. 737.

#### OPTIC NERVE.

- Fournier, J. C. M.** Blindness from Thyroid Deficiency. *Rev. Med. del Uruguay*, v. 21, p. 382.
- Goldenburg, M.** Tower Skull with Double Optic Nerve Atrophy. (3 ill., 2 pl.) *Amer. Jour. Ophth.*, v. 1, p. 760.
- Hansell, H. F.** Ocular Affections Dependent on Diseases of Tonsils. *Arch. of Ophth.*, v. 47, p. 573.
- Lambert, W. E.** Retrobulbar Neuritis of Septic Origin. *Arch. of Ophth.*, v. 47, p. 607.
- Zentmayer, W.** Hereditary Optic Nerve Atrophy with X-Ray Findings. *Arch. of Ophth.*, v. 47, p. 627.

#### COLOR VISION.

- Hess, C.** Evolution of Light and Color Sense. *Abst. Brit. Jour. Ophth.*, v. 2, p. 574.

#### EYEBALL.

- Weigelin, S.** Enuclation or Evisceration with Formation of Sockets in War Injuries. *Klin. M. f. Augenh.*, Sept.-Oct., 1917. *Abst. Brit. Jour. Ophth.*, v. 2, p. 585.

#### LACRIMAL APPARATUS.

- Basterra, S.** Detailed Technic of Extirpation of Lacrimal Sac. *Prog. de la Clin.*, 1917, p. 277.
- Clark, F. T.** Infantile Dacryocystitis. *Amer. Jour. Ophth.*, v. 1, p. 785.
- Connole, J. V.** Acute Bilateral Dacryocystitis. *United States Naval Med. Bull.*, v. 12, p. 706.
- Thompson, W. R.** Etiology and Treatment of Dacryocystitis. *Jour. Amer. Med. Assn.*, v. 71, p. 1727.



**LIDS.**

- Tartois.** Blepharoplasty without Pedicle. *Arch. d'Opht.*, v. 36, p. 320.

**ORBIT.**

- Nordentoft, S.** Roentgen Treatment of Exophthalmic Goiter. *Ugeskrift for Laeger*, v. 80, p. 1331. *Abst. Jour. Amer. Med. Assn.*, v. 71, p. 1702.
- Odriozola, E.** Exophthalmic Goiter in Girl of Sixteen. *Cron. Med.*, v. 35, p. 219.
- Rice, J. F.** Medical Treatment of Exophthalmic Goiter. *Med. Press*, v. 106, p. 236.
- Schwenk, P. N. K., and Posey, W. C.** Restoration of Orbital Socket. *Arch. of Ophth.*, v. 47, p. 576.

**PARASITES.**

- Motais, F.** Ocular Sparganose. (2 ill. Bibl.) *Arch. d'Opht.*, v. 36, p. 304.
- Pacheco Luna, R.** Filial Tumors. *Amer. Jour. Ophth.*, v. 1, p. 805.
- Tomkins, H. H.** Removal of Filaria from Eye. *Brit. Med. Jour.*, 1918, p. 632.

**TUMORS.**

- Kendall, H. W. M.** Krönlein Operation for Orbital Tumor. *New Zealand Med. Jour.*, 1918, v. 17, p. 79.
- Ring, G. O.** Growth of Ciliary Body After Cataract Extraction. *Amer. Jour. Ophth.*, v. 1, p. 734.
- Mulcahy, T. A., and Ewing, J.** Tuberculoma of Iris. (1 ill.) *Amer. Jour. Ophth.*, v. 1, p. 757.
- Posey, W. C.** Orbital Tumors Removed Through Incision Along External Orbital Rim. *Arch. of Ophth.*, v. 47, p. 551.

**INJURIES.**

- Berrisford, P. D.** Lens Opacity Following Contusion. *Arch. of Ophth.*, v. 47, p. 616.
- Blake, E. M.** Evulsion of Optic Nerve. *Arch. of Ophth.*, v. 47, p. 567.
- Derby, G. S.** Effects of "Mustard Gas" on Eyes. *Amer. Jour. Med. Sc.*, v. 156, p. 733.
- Frenkel, H.** Prognosis and Treatment of Penetrating Ocular Wounds. *Arch. d'Opht.*, v. 36, p. 193.
- Gibb, H. P., Juler, F. A., and Moore, R. F.** Treatment of Intraocular Foreign Bodies at Base Hospital in France. *Brit. Jour. Ophth.*, v. 2, p. 564.
- Hansell, H. F.** Gunshot Wound of Eye. *Amer. Jour. Ophth.*, v. 1, p. 735.
- Hoffman, J. R.** Accurate Localization of Foreign Bodies. *Illinois Med. Jour.*, v. 34, p. 260.
- Sweet, W. M.** Unusual Case of Steel Injury. *Amer. Jour. Ophth.*, v. 1, p. 735.
- Uchermann, A.** Rupture of Choroid from Direct Trauma. *Med. Rev. Bergen*, v. 35, p. 235.
- Verhoeff, F. H.** Siderosis Bulbi. *Brit. Jour. Ophth.*, v. 2, p. 571.
- Repeated Titles.** **Duverger.** (v. 1, p. 221.) *Brit. Jour. Ophth.*, v. 2, p. 585.

**GENERAL PATHOLOGY.**

- Lutz, A.** Unilateral Inheritance. *Arch. of Ophth.*, v. 47, p. 587.

**GENERAL DISEASES.**

- Basterra y Santa Cruz.** Treatment of Ocu-

lar Tuberculosis. *España Oftal.*, Aug., 1918, p. 132.

- Blackwood, J. M.** Relation of Lues to Ocular Pathology. *Amer. Jour. Ophth.*, v. 1, p. 784.

**Dantrelle, A.** Ocular Lesions in Exanthematous Typhus. *Arch. d'Opht.*, v. 36, p. 319.

**Drummond, H.** Ocular Signs of Trench Fever. *Quarterly Jour. Med.*, July, 1918. *Abst. Med. Press*, Oct. 9, 1918, p. 265.

**Findlay, L.** Lethargic Encephalitis. *Glasgow Med. Jour.*, v. 8, p. 193.

**Jackson, E.** Ocular Lesions of Influenza. *Amer. Jour. Ophth.*, v. 1, p. 801.

Ocular Lesions in Encephalitis Lethargica. *Lancet*, Oct. 26, 1918, p. 557.

**Weeks, J. E.** Tuberculin in Diseases of Eye. *Amer. Jour. Ophth.*, v. 1, p. 753.

**Zarzycki.** Ocular Complications of Cerebrospinal Meningitis. (1 ill.) *Arch. d'Opht.*, v. 36, p. 240.

**COMPARATIVE OPHTHALMOLOGY.**

**Ochoterena, I.** Retina of Horned Frog. *Gaceta de los Hosp. Mexico*, v. 1, p. 65.

*Abst. Jour. Amer. Med. Assn.*, v. 71, p. 1582.

**HYGIENE.**

**Gowens, H. L.** Care of Eyes of Children. *Jour. Amer. Inst. Homeop.*, v. 11, p. 546.

**Hill, H. W.** Protection of Eyes in Influenza Epidemics. *Jour. Amer. Med. Assn.*, v. 71, p. 1765.

Prevention of Blindness. *Jour. Amer. Med. Assn.*, v. 71, p. 1503.

**Schleisinger, F. S.** Hygiene of Eyes in School. *Rev. Med. del Rosario*, v. 8, p. 293.

**OPHTHALMIC SOCIOLOGY AND HISTORY.**

**Allport, F.** Artificial Eyes vs. Patriotism. *Amer. Jour. Ophth.*, v. 1, p. 803.

**Andrews, J. A.** Note from Labrador. *Amer. Jour. Ophth.*, v. 1, p. 744.

**Berens, C.** Need of Ophthalmological Clinic in Penal Institutions. *Arch. of Ophth.*, v. 47, p. 448.

**Collins, W. J.** Sir William Lawrence. (1 ill.) *Brit. Jour. Ophth.*, v. 2, p. 497.

**England, E. K.** Reeducation of Blinded Soldiers. *Amer. Jour. Clin. Med.*, Nov., 1918, p. 327.

**Knopf, S. A.** Blinded Soldiers as Masseurs. *Med. Rec.*, v. 94, p. 709.

Optical Glass. *Brit. Jour. Ophth.*, v. 2, p. 573.

**Terson, A.** Votive Offerings, Ocular. (1 ill.) *Arch. d'Opht.*, v. 36, p. 224.

Why Optometrists Should Not be Licensed as Doctors. *Texas State Jour. Med.*, v. 14, p. 241.

**Wood, C. A.** Ophthalmic Aspects of Medical and Surgical History of the War. *Amer. Jour. Ophth.*, v. 1, p. 739.

**Würdemann, H. V.** Ophthalmic Observations and Progress During the Great War. *Amer. Jour. Ophth.*, v. 1, p. 740.

**Repeated Titles.** **Santos Fernandez.** (v. 1, p. 544.) *Amer. Jour. Ophth.*, v. 1, p. 738.

# AMERICAN JOURNAL OF OPHTHALMOLOGY

SUPPLEMENT TO SERIES III, VOLUME I, 1918

BEING THE

## Ophthalmic Year Book Volume XIV

Containing a Digest of the Literature of Ophthalmology  
For the Year 1917 and Parts of 1918.

Edited by

EDWARD JACKSON, M. D.

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Illustrated

Published by the

**Ophthalmic Publishing Company**  
Chicago, Illinois  
1918





# CONTENTS

Explanation .....vii

## GENERAL DIAGNOSIS—

Ophthalmoscopy, 1; Diaphanoscopy, Oblique Illumination, Tonometry, 2; Radiography, Keratometry, Visual Acuity, 3; Perimetry, Photometry, 5; Tests for Simulation, Ocular Reactions in Death, General Diagnosis, 6.

## GENERAL THERAPEUTICS—

Vaccine and Serum Therapy, Radiotherapy, 7; Light Therapy, Heat Therapy, 8; Electrotherapy, Collyria, Subconjunctival Injections, 9; Mydriatics, Silver Salts, Antiseptics, 10; Anesthetics, Systemic Remedies, 11.

## OPERATIONS—

Sterilization, Local Anesthesia, General Anesthesia, 12; Instruments, Dressings, Special Operations, Opportune Operations, 13.

## REFRACTION—

Bicylindric Refraction, Optical Glass, Skiascopy, Subjective Tests, 14; Trial Lenses and Optometer, Cycloplegics, 15; Change in Refraction, Myopia, 17; Astigmatism, 18; Effects of Uncorrected Refractive Errors, 19; Accommodation, 20; Presbyopia, 21.

## OCULAR MOVEMENTS—

Summary of Progress, Anatomy and Physiology, 21; Instruments, 23; Diagnosis, Phorias, 24; Tropias, 25; Nystagmus, Case Reports, 27.

## THE CONJUNCTIVA—

Diagnosis and Distribution of Conjunctivitis, Ophthalmia Neonatorum, 31; Pneumococcal Conjunctivitis, 32; Diphtheritic Conjunctivitis, Squirrel Plague Conjunctivitis, Infection of Conjunctiva from Cats, Streptothrix of Conjunctiva, 33; Conjunctival Coccidia, Atropin Conjunctivitis, Diabetic Conjunctivitis, Induced Conjunctivitis, 34; Gas Injury to the Conjunctiva, Tetryl Conjunctivitis, Electric Ophthalmia, 35; Vernal Conjunctivitis, 36; Follicular Conjunctivitis, Trachoma, 37; Parinaud's Conjunctivitis, Tuberculosis of Conjunctiva, Conjunctivitis in Dysentery, 41; Symblepharon, Pemphigus, 42; Symblepharon, Xerosis, Subconjunctival Cyst, 43.

## CORNEA AND SCLERA—

Anatomy, 43; Groove Keratitis, Epithelial Dystrophy, Neuropathic Keratitis, 44; Bulbous Keratitis, Corneal Ulcers, 45; Pre-

vention of Corneal Infections, Diplobacillus Ulcer, Corneal Ulceration in Fish, Treatment of Corneal Ulcers, 46; Corneal Repair, Keratomalacia, Parenchymatous Keratitis, 48; Arcus Juvenilis, Degeneration, Corneal Opacities, Corneal Staining, 51; Conical Cornea, Marginal Ectasia, Blue Scleras and Fragilitas Ossium, 52; Episcleritis, Scleritis, Repair of Sclera, 53.

## ANTERIOR CHAMBER AND PUPIL—

Development of Anterior Chamber, Aqueous Humor, 54; Cyst in Anterior Chamber, Pupillary Membrane, Centers of Pupil Movements, 55; Mydriasis from Nasal Obstruction, Miosis, Paralysis of Cervical Sympathetic, Physiologic Inequality of Pupils, Argyll-Robertson Pupil, Hemianopic Pupil Reactions, 56; Pupil in Dementia Praecox, 57.

## THE UVEAL TRACT—

Anomalies, Heterochromia Iridis, 57; Aniridia, 58; Polycoria, Coloboma, 59; Anatomy and Physiology, 60; Etiology of Uveitis, 61; Modes of Infection, 62; Arthritic Iritis, 64; Gouty Iritis, 65; Gonorrheal Iritis, Choroiditis, 66; Uveal Tuberculosis, 67; Choroidal Tuberculosis, Uveal Lesions with Various General Diseases, 68; Subchronic Febrile Uveo-Parotitis, 69; Uveitis, 71; Atrophy of the Iris, 73; Atrophy of Choroid, 74; Ossification of the Choroid, 75.

## SYMPATHETIC DISEASES—

Ocular Anaphylaxis, 75; Pathogenesis of Sympathetic Ophthalmitis, Clinical Reports, 76; Prophylaxis, 77; Treatment of Sympathetic Ophthalmitis, Sympathetic Diseases other than Ophthalmitis, 78.

## GLAUCOMA—

Anatomy of the Filtration Channels, Physiology, 79; Hypotony, 80; Tonometry, Hydrophthalmos, 81; Etiology, 82; Symptomatology, Glaucoma Simplex, Secondary Glaucoma, 84; Operations, Postciliary Trephining, Iridotaxis, Sclerecto-iridectomy, Lagrange Operation, The Elliot Operation, 85; Late Infection, 86.

## THE CRYSTALLINE LENS—

Embryology, Dislocation of the Lens, Congenital and Zonular Cataracts, 87; Pathogenesis of Cataract, 88; Special Varieties of Cataract, 89; Concurrent Conditions, Complicated Cataracts, Macular Perception in Advanced Cataract, 90; Absorption of Cataract, 91; Couching, Cataract Extraction, 92; Corneal Suture, Iridectomy or Simple Extraction, 93; Irrigation,

Suction Method, Intracapsular Extraction, 94; Complications, 96; General Papers, 97; After Cataract, Results, 98.

#### VITREOUS HUMOR—

Loss and Replacement of Vitreous, Abnormalities, 100; Changes from Septic Wounds, Hemorrhage into Vitreous, Asteroïd Hyalitis, 101; Treatment of Vitreous Opacities, 102.

#### THE RETINA—

Anatomy, 102; Physiology, Chemistry and Physics, 103; Subjective Phenomena, 104; General Pathology, 105; Therapeutics, Leukemia, Retinal Conditions Following Injury, 106; Arterial Pulsation, Angiosclerosis, 107; Vascular Disease, Retinal Tuberculosis, 108; Retinitis Proliferans, Exudative Retinitis, 109; Syphilis, Obstruction of Retinal Vessels, 110; Retinitis in Pregnancy, Renal Retinitis, 111; Toxemia, Diabetic Retinitis, 112; Drüsen, Angioid Streaks, Retinitis Pigmentosa, 113; Other Retinal Degenerations, Amaurotic Family Idiocy, Solar Retinitis and Scotoma, 114; Lesions of Macula, Retino-Choroiditis Juxtapapillaris (Jensen), Reverse Seeing, von Hippel's Disease, 115; Retinal Degeneration with Aneurysms, Retinal Periphelebitis, Retino-Choroiditis, Gunn's Dots, Mongolian Idiocy, Spastic Paralysis, Hemeralopia, 116; Detachment of the Retina, 119.

#### TOXIC AMBLYOPIAS—

Quinin Amblyopia, 121; Ethylhydrocuprein Amblyopia, 122; Nitrophenol Amblyopia, Paint Amblyopia, 123; Wood Alcohol Amblyopia, Lead Amblyopia, 124.

#### THE OPTIC NERVE—

Anatomy and Histology, 124; Retrobulbar Neuritis, Papilledema, 126; Operations for Papilledema, 128; Optic Neuritis Following Acute Infection, 129; Optic Atrophy, 130.

#### VISUAL TRACTS AND CENTERS—

Physiology and Psychology, 133; Word Blindness, 134; Mirror Writing, Traumatic Dissociation, 135; Cerebral Localization, 136; The Lateral Fields, Permanent Hemianopias, 138; Transient and Partial Hemianopias, 139; Complicated Hemianopias, 140; Cranial Deformity, Oxycephaly, Visual Fields in Pellagra, 141; Hysterical Blindness, Psychic Blind Spot, An Optical Illusion, Hypophyseal Disturbances, 142; Tumors, 145.

#### COLOR VISION—

Color Blindness in the Peripheral Retina, 147; Neutral Zones in the Spectrum, Visual Stimulation Intensities, 148; Tests for Color Blindness, Total Achromatopsia, 149; Color Spectra in the Aged, 150.

#### THE EYEBALL—

Anophthalmos, 151; Panophthalmitis, 153; Spontaneous Explosion of Artificial Eyes, Dislocation of Eyeball, 154; Evisceration, Enucleation, 155; Implantation, 156; Prosthesis, Restoration of Shrunken Sockets, 158.

#### THE LACRIMAL APPARATUS—

Extirpation of the Lacrimal Glands, Lacrimal Drainage, 159; Abscess of Canaliculus, Lacrimal Stenosis in Infants, Infection of the Lacrimal Canal, 160; Treatment of Lacrimonasal Obstruction, 161; Thread Drainage for Chronic Dacryocystitis, Window Resection, 162; Dacryocystorhinostomy, Excision of Lacrimal Sac, Miscellaneous Conditions, 163.

#### DISEASES OF THE LIDS—

Anomalies, 163; Movements, 164; Ptosis, 165; Marginal Blepharitis, Eczema, 166; Gangrene of the Lids, Herpes, 167; Syphilis, Tuberculosis, 169; Chalazion, 170; Symblepharon, Elephantiasis, Trichiasis, Entropion, 171; Entropion, 172; Plastic Operations, 173.

#### DISEASES OF THE ORBIT—

Anatomy, Exophthalmos, 174; Exophthalmic Goiter, 176; Aneurism, 177; Enophthalmos, Orbital Cysts, Tenonitis, 178; Cellulitis, 179; Echinococcus Cyst, Larvae in Orbit, Tuberculosis, 180; Syphilis, Aneurism in Cavernous Sinus, Thrombosis of Cavernous Sinus, Loss of Orbital Margin, Rodent Ulcer of Orbit, Retaining Floor of Orbit, Prosthetic Operations, 181; Contracted Socket, Masks for Deformities from Facial Wounds, 182; Explosion of Artificial Eye, 183.

#### TUMORS—

Lacrimal Tumors, Tumors of the Lids, 184; Tumors of the Conjunctiva, 185; Tumors of the Cornea and Limbus, 186; Tumors of the Iris, Tumors of the Choroid, 187; Tumors of the Retina, 190; Tumors of the Optic Nerve and Sheath, 191; Tumors of the Orbit, 192; Treatment of Tumors, 195.

#### INJURIES—

Injuries from Heat, Injury from Electricity, Chemic Injuries, Gassing, 195; Contusions, 196; Penetrating Wounds of Eyeball, 199; Injuries from Spectacle Lens, 202; Foreign Bodies, 203; Localization of Foreign Bodies, 208; Magnet Operations, 210; Gunshot Wounds of Eyeball and Orbit, 211; Wounds of Tracts and Centers, 212; Birth Injury, General Papers, 213; Industrial Injuries, 215.

#### GENERAL PATHOLOGY—

Heredity in Eye Conditions, 217; Degenerative Changes, 218; Cicatricial Changes, Cholesterin in the Eye, Influence of X-

Ray, Differentiation of Diplobacilli, Chemistry of Ocular Pigment, Anaphylaxis, 219; Accidental Somatic Changes, Eye of the Negro, 220; Eyes of Retarded Children, 221.

# **GENERAL DISEASES—**

Measles, Scarlet Fever, Antityphoid Vaccination, Infective Jaundice, 222; The Plague, Cerebrospinal Meningitis, Miscellaneous Infections, 223; Gonococcus Infection, Syphilis, 224; Sporotrichosis, 226; Streptothrix Infection, Tuberculosis, 227; Leprosy, Polycythemia, 228; Leukemia, Internal Secretions, Exophthalmic Goiter, 229; Nutrition, Renal Disease, Dental Disease, Disease of Mouth, Pharynx and Tonsils, Diseases of Nose and Accessory Sinuses, 230; Thrombosis of the Cavernous Sinus, Organic Diseases of the Brain and Spinal Cord, 231; Functional Nervous Disease, 232; Sympathetic Lesions, 233; The Ophthalmocardiac Reflex, General Papers, 234.

# **PARASITES—**

Myiasis of the Conjunctiva, 234; Cysti-

cercus, Hydatid Cysts, Filariasis of the Conjunctiva, 235.

# **HYGIENE—**

Lighting in its Relation to the Eye, 236; Injuries by Light and Other Radiations, 237; Snow-Blindness, Moving Pictures, 238; Effects of Glare, Illumination for Fine Hand Work, Eye-strain and Higher Education, Classes on the Conservation of Vision, Ocular Work and Rest in Childhood, Unusual Dangers, Protective Glasses, 239.

# **OPHTHALMIC SOCIOLOGY AND HISTORY—**

Prophylaxis, Training of the Blind, 241; Visual Requirements for Various Purposes, 244; Industrial Injuries and Compensation, 247; Ophthalmic Education, 249; Optometry, 250; Nomenclature, Clinical Institutions and Statistics, 251; History, 252.

# **BIBLIOGRAPHY, 255.**

# **INDEX OF SUBJECTS, 289.**





# EXPLANATION

This supplement to the AMERICAN JOURNAL OF OPHTHALMOLOGY is paged to be bound separately, so as to constitute a volume in continuation of the series of the Ophthalmic Year-book. It consists essentially of the Table of Contents which precedes, the Digest of the Literature that immediately follows, the Bibliography coming after that, and the Subject Index completing the volume.

The Table of Contents shows the grouping of subjects in the "Digest." Not all subjects appear in this table; but enough are given to enable anyone familiar with ophthalmology to judge where in the volume a particular topic would be found, if it has been discussed in the literature of the period covered. The period covered is generally a year or more. In this particular volume it takes up the literature, succeeding that noticed in volume 13 of the Ophthalmic Year Book, and reviews it up to the time each particular section of the digest was written.

At the head of each section is mentioned the period it covers. In this particular volume these periods vary from 11 to 22 months. This is because of the transition from an annual volume to the publication of some part each month. Hereafter each section will represent the literature of the year elapsed since the last review on the subject was written.

The Digest of the Literature gives the essential discoveries or new ideas published; as those (p. 8), with regard to the sterilization of corneal ulcers, or the effects on the lens of radium exposures in the treatment of retinal gli-

oma. Important studies like those on the development of the anterior chamber or the secretion of the aqueous, receive extended notice.

Clinical observations regarding important facts make up a large part of the Digest; and papers that include nothing new, but may be worth consulting by some one engaged in the study of a particular subject, also are mentioned, with some indication of what they contain. Some papers which contain only what is already current in ophthalmic treatises and journals, and are intended for the instruction of those who are not ophthalmologists, are not mentioned.

The paragraph headings indicate the general subjects dealt with, or the particular one of several subjects that make the paper valuable. Other subjects mentioned incidentally are often indicated in italics. The names of authors of papers are printed in **heavy face** type, to make them quickly discoverable when the statements made by a particular author are the matter of interest. To discover where the paper referred to has been printed, turn to the author's name in the bibliography.

The Bibliography includes the titles of all papers alluded to in the "Digest," and a few others not so used; with the journal, volume, and page on which they are to be found. The title is always given in English, and often is abbreviated, or altered so as to indicate more clearly what the paper is about.

The arrangement is by the authors' names, placed alphabetically; the titles of all papers an author has published

being grouped under his name. Papers of joint authorship are placed below the name of the author first mentioned in the publication; and are cross-referenced under the name of the other author or authors. A special explanation of the method of using the bibliography will be found preceding the first name on page 255. The last figures (**heavy face**), given after each title, indicate the page in the digest on which the paper is referred to.

The Subject Index follows the bibliography. It is the ordinary alphabetic index of the book. It supplements the general arrangements of the

"Digest" as shown in the table of contents. It must be remembered in using it that a subject may be indexed by the use of any one of several leading words. "Acuteness of Vision" may be indexed under A; or under V as "Visual Acuity," or "Vision." If reference to the desired topic is not found under the word first thought of, look for it under some other word that might have been used instead. If not found in this way, one may fall back on the table of contents, and examine the sections of the digest in which it would naturally be considered. —E. J.



# DIGEST OF THE LITERATURE.

## METHODS OF DIAGNOSIS.

EDWARD JACKSON, M. D.

DENVER.

This section reviews the literature of 1917, on ophthalmic diagnosis in general. Papers referring to the diagnosis of any particular disease will be found mentioned under the heading of that disease or the class to which it belongs.

**OPHTHALMOSCOPY.**—**Lucanus** to examine the anterior media illuminates the eye with the ophthalmoscope from a distance of one-half meter, and views it through a convex 6 D. lens held nearly its focal distance from the cornea. This magnifies the cornea about two diameters and shows minute foreign bodies, epithelial lesions, and minute opacities that are invisible by ordinary oblique illumination.

**Feilchenfeld**, to secure a dark-room in a large light ward, has used an umbrella with a black curtain attached to its margin much as suggested by **Lundsgaard** (*O. Y. B.*, v. 11, p. 18). Beneath this the patient and surgeon can escape the general illumination around them.

**Blanco** adopts the view that the unfavorable results on vision following the use of arsenical preparations, especially salvarsan and neosalvarsan, are due to the exaggeration of previously existing ocular diseases. He therefore urges that prior to their administration a careful ophthalmoscopic examination should be made; and believes that when the eyes are strictly normal the therapeutic use of such drugs is not dangerous.

**Best**, in 328 cases of serious war injuries to the head, found choking of the disc in 40 per cent. But in the first year of the war they amounted to 45 per cent., and in the second year to only 25 per cent., the improvement being ascribed to early and frequent intervention. The choking was more marked on the side of the injury in 61 out of 70 cases. In one case the swell-

ing appeared as late as the fifty-second day. In a war atlas of ophthalmoscopy **v. Szily** has published plates of various injuries in the ocular fundus.

The post-mortem segmentation of the blood column in the retinal veins due to coagulation has been described

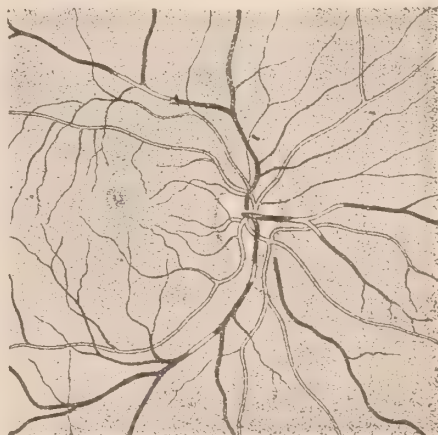


Fig. 1.—Interruption of blood column in retinal veins an early sign of death. (Kahn.)

by **Kahn**, who records his observation in three cases. The interruption of the venous blood column gave the appearance indicated in the accompanying illustration.

Such interruptions were found in the larger veins, in one case as early as forty-five minutes after death. The examination may be facilitated by dilatation with a mydriatic, which is possible several hours after death. Clouding of the cornea may be prevented or removed by instillation of distilled water. Among the many ocu-

lar signs of death that have been described (see p. 6) this is perhaps one of the most reliable and important.

**DIAPHANOSCOPY (TRANSILLUMINATION).**—The only allusion to the method of making this examination in the literature of the year, is that of **May**, who endorses the suggestion of Young (O. Y. B., v. 13, p. 19), for using the lamp and illuminating rod of the May ophthalmoscope. A half-inch of rubber tubing slipped over the lamp with its end applied to the cutaneous surface of the lids will give the necessary illumination.

**OBLIQUE ILLUMINATION.** — **Koeppé** has used the Nernst lamp and the Gullstrand arrangement of lenses as a corneal microscope. By such microscope during life he is able to positively recognize, at a very early stage, the tissue changes of the palpebral conjunctiva and limbus in vernal conjunctivitis. These changes indicate the importance of the vascular proliferation.

He has studied defects in the endothelium of Descemet's membrane, and the changes in the deepest layers of the cornea produced by the penetration of the aqueous. Some of the changes constitute an internal bullous keratitis developing from epithelial phlyctenules. Congenital swellings at the posterior surface of the cornea were also noted. In all forms of iritis he found deposits upon the posterior corneal surface. These take the form of droplets, fibres, stars, or conglomerates. The Nernst lamp enables such deposits to be recognized at a stage when they would be invisible with the ordinary corneal microscope. Such deposits are found less frequently on the anterior capsule of the lens. They are of no importance in determining the etiology.

**TONOMETRY.**—A new form of tonometer devised by **Albarenque** has a foot-plate, 8 mm. in diameter, attached to a rod which pushes against a spring. The rod is graduated both ways from a point designated by N. This point is reached by a pressure equivalent to 20 mm. of mercury, which Albarenque takes to be the normal intraocular

pressure. From this point the graduation extends both ways. The advantages claimed are that the instrument can be used with the patient either sitting or standing erect and the eyes directed horizontally. The test should be repeated several times and the average taken as the definite tension of the eye.

**Cridland** has tested 1,001 normal eyes with the Schiötz tonometer, the patients varying in age from 7 to 88 years. The results he has tabulated by decades, and also according to sex. He gives them in supposed equivalent millimeters of mercury.

He found the tension highest in the first decade, 23.75 for 12 patients. In the second decade it is 20.69; in the third decade 19.30; in the fourth 19.13; in the fifth it rose to 19.26, and in the sixth to 21.47; but in the seventh decade and later fell again to 19.58. In each decade it was higher for females than for males, the difference being 5 mm. in the first decade and 0.15 mm. in the last.

He also reviews 70 consecutive cases in which the tonometer was used because of clinical indications. Of these 42 were undoubtedly cases of glaucoma. In none of them was the reading below 27 mm., but in 28 cases no glaucoma had developed up to the time of the reading of his paper. All these patients were over 40 years of age. Ten of them gave readings varying from 25 to 32.5. Five were cases of arteriosclerosis, with high blood pressure. Three of them were watched over periods of 6 to 11 years without showing symptoms of glaucoma.

Cridland sets the limits of normal readings as 11.9 to 28.55, and the average normal reading at 19.58. A difference between the readings of the two eyes of the same patient was noted in 21.2 per cent. of the cases. This difference varied from 0.5 to 7.5, and averaged 2.43 mm.

Cridland thinks that for one who works with the tonometer regularly the value of the instrument is not lessened by keeping records in supposed equivalent millimeters of mercury.

**Jackson** points out that lack of correspondence between the foot-plate of the instrument and the corneal curvature is liable to affect the reading. In 2,000 eyes he found the corneal curvature to vary from a radius of 6.5 to 11 mm.; although in almost 99 per cent. of the cases the curvature was from 7 to 8.5 mm. radius. In the extreme case of an 11 mm. radius of curvature the error due to this cause was the supposed equivalent of 8 or 10 mm. of mercury. He cites one case in which the cornea had a curvature radius of 7.1 mm. and the tonometer reading was supposed to indicate a pressure of 32 mm. Upon this a diagnosis of glaucoma had been made by another oculist and treatment instituted. But further observation of the case seemed to show that no glaucoma had been present. He found that stiffening of the coats of the eye by exposure to formaldehyde solution affected the tonometer reading so as to indicate a higher intraocular pressure. But the most important limitations on the practical use of the tonometer arises from high readings that would indicate glaucoma when other uveal inflammations are present.

**RADIOGRAPHY.**—In discussing radiography of the eye and orbit **Dixon** says it makes little difference what particular method of localization is used if the operator is familiar with it and "pays the strictest attention to the smallest details." The general radiographer is most likely to fail through not securing perfect fixation of the eye so that a foreign body fails to leave an appreciable shadow. He mentions one case in which eight radiograms failed to show any foreign body. The ninth taken by another operator showed it. It would have been shown on the first if the same care had been taken. It is better always to take two plates, since a defect on one plate, or a peculiar lining up of the septa of the nasal accessory sinuses, may imitate the shadow of a foreign body. He has not been able to determine the presence of tumors within the eyeball; but tumors in the orbit, as well as thickening or absorption of the orbital wall can thus

be recognized. Fractures involving the wall of the orbit will generally escape detection, unless so obvious as to be evident by other methods.

The localizing charts in use by radiographers, especially those used at the Royal London Ophthalmic Hospital, are criticized by **Fisher**. He finds they are based on Sappey's measurements of the female eye. The male eye is about one millimeter longer in its diameter, and the greater bulk of industrial accidents requiring radiography occur in males. This introduces an error with regard to the critical point as to whether a foreign body is within or outside of the eyeball. A point which Fisher does not discuss, but which is of equal practical importance, is that the localizing diagrams must be proportioned to allow for the divergence of the Roentgen rays; and the relative distance of the tube from the eye and plate must be properly observed.

Fisher does point out the importance of remembering that localization has to do with three coordinates. A point determined on the diagram may appear well inside of the eyeball, but if far enough forward or far enough back it may really lie entirely outside the globe. Thus a foreign body might be supposed to lie in the ciliary processes, where it would be most dangerous, when in reality it was embedded in the sclera and practically harmless.

**Villasevaglios** has written a monograph on Roentgen ray diagnosis of ocular diseases. His subject includes the diagnosis of intracranial processes, especially those in the region of the chiasm, lesions of the orbital walls, and anomalies in the shape of the orbit, diseases of the neighboring sinuses, and foreign bodies in the eyeball.

**KERATOMETRY**—**Mitchell**, in studying the reflections from the corneal surface, found great difficulty in securing steady fixation of the patient's eye. This he has overcome by placing a piece of white paper, 2 cm. square, on the tube of the instrument for the patient to look at.

**VISUAL ACUITY.**—It is pointed out by **Luckiesh** that visual acuity is greater



by monochromatic light than by light representing a larger part of the spectrum. This is generally supposed to be due to the absence of chromatic aberration with the former. He reports the results of comparisons made with the Ives-Cobb instrument for testing visual acuity (O. Y. B., v. 10, p. 383). These results are as follows:

ACUITY AND BRIGHTNESS WITH DIFFERENT LIGHT SOURCES.

Source.	Acuity (Snellen Scale).	Equivalent Brightness of test-object (MgO Surface Illumination in meter-candles).
Green mercury line...	1.28	10
Tungsten lamp .....	1.14	10
Artificial daylight...	1.11	10
Tungsten lamp .....	1.28	28

The acuity is much greater for the monochromatic green light than for either tungsten light or daylight of the same brightness.

with the International test and the Ewing test. As compared with the International test, their results show that the visual acuity required to recognize each of the letters of standard 5' size was as follows:

L	0.62	F	0.81
A	0.71	C	0.85
T	0.72	K	0.88
V	0.74	O	0.88
H	0.74	D	0.88
Z	0.76	X	0.91
E	0.77	R	0.93
N	0.79	S	1.05
P	0.79	B	1.15

The Ewing test is slightly more difficult to recognize than the International Broken Ring, or any of the letters except B, being 1.13.

The value of symmetric groups on the International Broken-Ring test for testing visual acuity is urged by Jackson. With four cards indicating vision of 0.1, 0.5, 1 and 2 at five meters, all variations of visual acuity can be measured by varying the distance of the

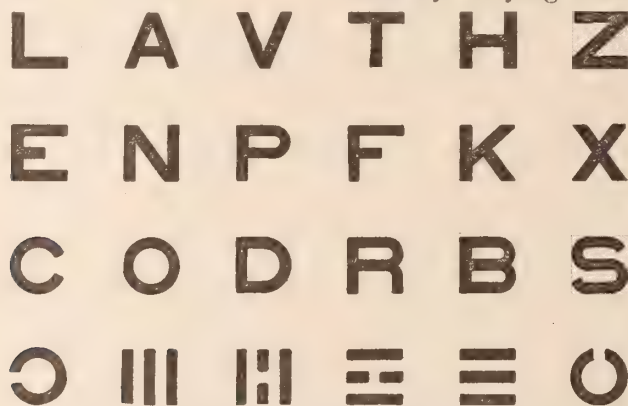


Fig. 2.—Gothic letters, Broken Rings and Ewing test for use at five meters. (Sec. on Ophthalmology A. M. A., 1917.)

Dunlap finds that visual discrimination is better measured by using a rectangular aperture of sensible width than with a line or slit. With such a test he found that light adapted eyes gave threshold values 30 per cent lower than eyes that were dark adapted.

The Committee of the Section on Ophthalmology of the American Medical Association (1917, p. 346) on Standardizing Test Cards, reported on comparisons of Gothic letters. The letters chosen are shown in Fig. 2, along

card from the eye. Each half meter represents a change of one-tenth in the vision indicated; so that with one card each 0.01 of vision can be ascertained from 0.01 to 0.1. With a second card .05 intervals are obtained from .05 to 0.5. With a third card 0.1 intervals are obtained from 0.1 to 1. With a fourth card 0.2 intervals from 0.2 to 2. Lobanoff has discussed the problem of lack of correspondence between visual acuity and the objective changes in the eye. For the practical testing of visual

acuity of each eye separately **Thomas** has resorted to a reversible cardboard shade, which is easily kept in place, permitting the use of either eye alone as desired.

**PERIMETRY.**—A new hand perimeter has been devised by **Price**. The patient fixes the reflection of his own eye in a mirror. The test object is a cube, which passes along an arc having a radius of 13 inches. Dials indicate the position of the test object on its own arc and the meridian to which the arc corresponds. The sides of the test object are each 1 cm. square, and of the different colors used. **Price** claims that the instrument is accurate, speedy, comfortable for both patient and oculist, may be used anywhere, is comparatively cheap, and takes but little room.

The **Haitz** chart for stereoscopic mapping of the visual field (*O. Y. B.*, v. 4, p. 21) has been modified by **Lloyd**, who has extended it laterally to include the field up to 25 degrees from the fixation point. This is sufficient for the mapping of the blind spot. He has also had it made of slate, so that the boundaries of the field can be marked on it in chalk. Extension of the field renders necessary a special form of stereoscope, which has been made by the **Bausch & Lomb Company**.

The **Haitz** binocular localization of scotomata by means of the stereoscope has proven of such inestimable value to **Wells** that he has published a translation of the instructions that accompanied these charts believing that few have been able to get their exact significance from the original.

**Walker** has devised a perimetric apparatus, which can be suspended from above for taking accurately the field of vision of patients lying in bed. With this he has combined a series of lamps arranged in an incomplete circle, and chosen so as to furnish an artificial daylight. For this apparatus he claims the greatest possible range of service. The artificial illumination has proven a perfectly satisfactory substitute for daylight, superior to daylight in uniformity, constancy, availability, and control.

**Peter** has compared the campimeter

with the arc perimeter as to accuracy, practicability, and simplicity of technic, and finds the former so much superior that he regards the arc perimeter in its present form an obsolete instrument.

The significance of the so-called spiral fields of vision has been discussed by **Beaumont**, who regards them as evidence of rapid fatigue, and on that account as belonging particularly to neurasthenia. On the other hand, **Hurst** believes that when such a field is found it is an evidence of susceptibility of the patient to suggestion; and that the suggestion had been made in the method of taking the field of vision, or otherwise. Hence, they would be an evidence rather of hysteria than of neurasthenia. But in any case they depend more upon how the field is taken, and upon who takes it, than upon the condition present. Such fields cannot settle the diagnosis between malingering and hysteria.

The diagnostic and prognostic importance of the visual fields in ocular affections is the subject of a paper by **Sanchez Aguilera**.

**PHOTOMETRY.**—This subject is being scientifically studied chiefly in connection with artificial lighting by electricity. The papers bearing upon it appear in journals or society transactions devoted to physics and electrical engineering. Abstracts of several of them sufficiently complete for all purposes of the ophthalmologist appear in the *Abstract Bulletin of the Nela Research Laboratory*.

The visibility of radiation in the red end of the visible spectrum has been restudied by **Hyde** and **Forsythe**, who give a table showing the mean visibility of such radiations in nine subjects, and comparing these with other published results. In the main, they all agree fairly well, but the present table instead of stopping at 0.700, is carried to wave lengths of 0.770, where the visibility is only 1/10,000 as great as for 0.640. Differences between individuals are found here as they are in all other parts of the spectrum.

**Hyde**, **Cady** and **Forsythe** report investigations on the transmission of red pyrometer glass, both as to the

effective wave-length of monochromatic transmission, and changes due to variations in temperature, the limiting value of effective wave-length at different temperatures, or a temperature coefficient of transmission.

The effects of diffraction on the brightness measurements made with the optical pyrometer has been investigated by **Worthing** and **Forsythe**, who as a result lay down a series of some twelve necessary or desirable working conditions for such tests. The effects of diffraction, they believe, explain apparent discrepancies in such measures. Therefore, the source to be studied should be used as a background rather than a pyrometer filament, and the same filament should be used through the whole series of comparisons. The angle of the pencil used must be properly adapted by a diaphragm.

**Ives** and **Luckiesh** have made a special study of the influence of temperature on the phosphorescence of the alkaline earth sulphides. The varying rates of the growth and decay of the different color sensations have been suggested as causing discrepancies between the results of flicker photometry and direct comparison. **Luckiesh** has studied this subject and comes to the conclusion that the evidence is in favor of the flicker photometry.

A method of testing incandescent filaments for "spots"—portions where the filament is brighter or darker than the general average, has been described by **Lorenz**. The "overshooting," or excessive brightness of tungsten lamps when first lighted is believed by **Worthing** to be a physical fact and not merely physiologic. It occurs when the tungsten filament is in vacuum, and also when surrounded by gas; in the latter case amounting to about 6 per cent of the candle power. A plan of rating lamps as to filament brightness for use of fluctuating voltages has been devised by **Worthing**. An investigation of the diffusing effects of glassware used in lighting is recorded by **Luckiesh**.

**TESTS FOR SIMULATION.**—In connection with military service these tests have at present a greatly increased in-

terest and importance. The unmasking of simulation is largely a contest of wits. **Majewski** speaks favorably of a psychologic test, applied by the Snellen illiterate card or the broken ring. When the subject persistently indicates the wrong direction through a series of twenty or more answers he is certainly malingering. If unable to see he should be right one time in four by mere chance. **Lischkoff** points out that the malingerer should never know he is under suspicion. Repeated examinations may be necessary. A general review of the more valuable of such tests has been published by **Keiper**. **Bernheim** has written on simulated and psychic blindness and autosuggestion.

**OCULAR REACTIONS IN DEATH.**—The signs of ocular reactions of death is the subject of a paper by **Terson**, who reviews the literature. He finds the conditions of the lids and palpebral aperture too variable to be of much value. The softening of the eyeball comes on only after some hours. The changes in the cornea may appear before death, and depend rather on exposure. Ophthalmoscopy cannot be usually serviceable. (See p. 1.)

The variability of the pupil and its behavior under mydriatics and miotics, makes it a very uncertain sign, even its reaction to an electric stimulus. Too much importance should not be attached to the effects of injections of fluorescein. The reaction of the tissues to dionin and other irritants is more reliable, and is found to cease within two hours after death.

**GENERAL DIAGNOSIS.**—The work of **Foster** on *Diagnosis from Ocular Symptoms* is original rather in its methods of considering and grouping the facts, than for any new diagnostic methods or special significance attached to particular symptoms. **Bal-lantyne** has written on eye symptoms and their interpretation. **Burke** considers the ophthalmoscopic findings in head injuries, and **Trainor** the fundus examination in vascular and brain disease. **MacKenzie**, **Osborne**, and **Harkness** have discussed the general diagnosis of ocular disease, and the ocular symptoms in constitutional disorders.



## THERAPEUTICS.

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This section reviews the literature referring to general therapeutics appearing during 1917 to November 30th. The literature of particular diseases either constitutional or local will be noticed in the sections referring to those diseases.

**VACCINE AND SERUM THERAPY.** Writing with regard to the treatment of tuberculous eyes by local applications of tuberculin, **Ellis and Gay** state that it is now their routine practice to test every superficial recurrent inflammatory condition of the eyes and lids for tuberculosis; and that they are arriving at the conclusion that nearly all superficial nebulas and maculas are of tuberculous origin. All the cases so far treated have proved curable in from six weeks to three months; and so far only one relapse has occurred where the treatment has been completed, in spite of the fact that many of the cases have been continuously bad for years. In some of the worst cases the complete freedom from attack has existed for over eighteen months. The cases treated were mostly in children.

The treatment consists in instilling tuberculin into the conjunctival sac in various dilutions of increasing strength. No atropin or other local drug is used, except where the reaction from the tuberculin is excessive. In every case a preliminary cutaneous test is done on the forearm with tuberculin, using various strengths from undiluted bovine tuberculin to one in ten thousand human tuberculin. This is done not only for diagnosis, but to record susceptibility to tuberculin, the patients being classified into the following definite classes: hypersensitive, sensitive, subsensitive and insensitive. Various dilutions are used, each being ten times as weak as the next. The treatment is frequently repeated three times a week instead of twice. When the removal of opacities is undertaken the treatment is best commenced while the eye is quiescent, the dose being rapidly increased until a reaction is obtained, as it is found that some part of the opacity is generally removed at

each subsidence of the congestive symptoms.

**Phillips** emphasises the fact that the general tendency is to use the various tuberculins in excessive doses. If a reaction occurs, especially a focal reaction, tuberculin should not be given again until absolutely all signs of the reaction have disappeared.

Quoting the announcement by the Rockefeller Institute, that the pneumococcus is no longer to be regarded as a single organism but as a family of cocci composed of four different species, **Lehrfeld** states that the use of mixed pneumococcic serums at the Wills Eye Hospital has been very encouraging. While waiting for the laboratory to study the types found in the eye he proceeds to use the mixed serums. Local instillation in the culs-de-sac of the infected eye can only be relied upon in the superficial infections of the globe. In fulminating inflammations of the eye where the deeper structures are involved, it is advisable to use the serum intravenously as in the case of lobar pneumonia.

**Mueller and Thanner**, and in English **Dimitry**, describe the use of parenteral injection of albumin in the form of sterilized milk in the treatment of various eye conditions. The injections were always made into the gluteal muscles, using at each injection five c. c. of perfectly fresh milk, boiled for four or five minutes. A number of cases of iritis treated with injections of milk showed a rapid diminution of hyperesthesia and photophobia, and a shortening of the course of the disease. Usually three injections were given in a week, the treatment being renewed if necessary after a pause.

**RADIOTHERAPY.** Before the 1916 Heidelberg Congress (the proceedings of which are well reported in the

French *Annales d'Oculistique*), **Axenfeld** recalls the observation of a case of double glioma published by Kupferle, Wiedersheim, and himself in 1915. The retrogression of pain under radiotherapy continued. In the autumn of 1915, a cataract developed, which was operated upon in the summer of 1916. In this child of three years vision did not return until six months after the operation, a condition analogous to the amaurosis produced by blepharospasm having developed. The developing crystalline lens was damaged by the strong doses of the X-ray. This, however, is not a contraindication to such treatment. Radiotherapy should only be preferred to enucleation for the second eye, and when the vision is not too greatly diminished. The paper by **Cupérus**, noticed in volume 11, O. Y. B., p. 31, on the mesothorium treatment of eye diseases, now appears in English.

**LIGHT THERAPY.** **George and Toren**, who have for some years employed the leucodescent or therapeutic lamp in treatment of corneal ulcers, iritis, and episcleritis, describe a special therapeutic lamp for ocular use, in which the bulb is made of violet glass with a view to excluding the heat-producing rays of light, which soon become intolerable to the eye. It is necessary that the lamp shall be standardized as to focal distance, character of light, and the amount of heat produced. The lamp consists of an aluminum parabolic reflector containing a fifty-watt electric light with a violet glass globe, mounted on an adjustable stand with an adjustable face rest. With the lamp used by the authors, the patient must be so placed that the cornea will be at a distance of sixty mm. from the front of the bulb. Corneal ulcers, including those with hypopyon, iritis, episcleritis, and orbital abscesses are mentioned as having been treated successfully with the lamp.

**HEAT THERAPY.** For the treatment of hemorrhagic exudates and of transudates in the region of the anterior chamber, and also of affections of the anterior region of the eyeball, **Schieck** describes a method of diathermy which is said to have been used successfully

in the hospital at Siemensstadt. One electrode is attached to the arm, the other is fastened to a glass receptacle filled with a physiologic solution of common salt and applied in the fashion of an eye bath around the eye; upon opening the lids the cornea is bathed in the liquid. Even with a current of one ampère, an intense heat is communicated to the eyeball at the end of a few minutes.

From a series of experiments on rabbits' eyes, **Shahan** concluded that a temperature of 152 degrees F. applied for one minute was sufficient to stop an ulcerative process. From further experiments to determine how much damage this amount of heat did when applied to a normal eye, it was found in general that there was complete destruction of the epithelium over an area somewhat larger than the point used. The surface of the cornea became cloudy. But the epithelium replaced itself in four or five days, and the clouding slowly diminished. A description is given of a number of human cases in which the method was used for the treatment of pneumococcus infection of the cornea; the results indicating that heat when properly used is an effective therapeutic agent in such conditions.

In place of the somewhat complicated thermophor previously demonstrated by the author, he now describes a much simpler apparatus which may be used for one minute applications. A heavy piece of brass or copper tubing four inches long and nine-sixteenths inches in outside diameter, spoken of as the core, has at one end a lock-nut for holding fast the thermometer, while the other end receives the applicators. The applicator, shaped like a bullet, is hollowed out at the cylindrical end, to receive the bulb of the thermometer. A metal case, one and a quarter inches in diameter and a little over four inches long and heavily lined with felt, is just large enough in its inside measurements to receive the core. This acts as an insulating jacket for retaining the heat.

To use the instrument a properly shaped applicator is selected and



slipped into the end of the core. The thermometer is then fastened in place by a few turns of the lock-nut. Using the thermometer as a stem, the core is held over a flame until the mercury in the thermometer reaches about 170 degrees F. The core is then slipped into the insulating jacket, and the mercury in the thermometer observed until it falls to 156 degrees F. At this instant the tip of the applicator is placed in contact with the ulcer and held there for one minute, during which time the mercury will fall from five to ten degrees F. Care must be taken to see that the thermometer is in order, and directions are given for this purpose. In some later work the author states that it was found better to start with a temperature of 158 degrees F. instead of 156 degrees, as being more certain to stop the process in one application of one minute's duration.

For the removal of malignant and benign growths in the skin of the lids or of the face about the eyes, or in the conjunctiva, cornea or sclera, **Kearney** favors desiccation because the result is produced without the formation of a contracted scar. He uses for the process a high-frequency current produced through a high-speed static apparatus of sufficient power to dehydrate the cells, but not to carbonize them.

**ELECTROTHERAPY.** **Simon de Guilleuma**, impressed by the difficulties surrounding the ionization of the eyeball, describes a new model of combined eye cup and electrode. His apparatus consists of an ordinary glass eye cup through whose wall is inserted on the one side an electrical terminal, and on the other side a compressible rubber bulb for introducing into the eye cup at the proper time the fluid through which it is desired to ionize the eye. A small opening is also left in what would normally be the floor of the cup for the escape of air as the fluid is introduced. The patient is placed on his back, the eye cup applied, and the solution introduced into the cup from the rubber bulb. Where the treatment is to be of long duration, the cup may be retained in place by means of a rubber band passing around the patient's head.

**Urre** strongly recommends the employment of high-frequency currents in the treatment of various ocular disturbances, including corneal opacities, corneal ulcers, optic neuritis, and iritis.

**COLLYRIA.** **Macht** briefly refers to the literature of poisoning by absorption of small quantities of drugs instilled into the conjunctival sac. Such reports include examples of idiosyncrasy to cocaine and atropin. Macht has himself found by experiments upon dogs that vomiting may be produced by the introduction of apomorphin into the conjunctival sac.

**SUBCONJUNCTIVAL INJECTIONS.** The paper by **Jones** reiterates in some detail the general results with subconjunctival injections of cyanide of mercury which have been obtained by him in the past thirteen or fourteen years. Almost any formula may be used, so long as a sufficiently intense reaction is produced. Personally, Jones uses two cubic centimeters or half a fluid dram of a one to fifteen hundred solution, to which are added some acoin to lessen the resulting pain, a little boric acid to avoid precipitation of the acoin by a trace of alkalinity, one-eighth to a quarter grain of morphin to relieve the pain following the injection, and usually about a quarter grain of dionin. One prerequisite of the procedure is long continued and free use of cocaine, a little of which is also put into the unoperated eye. The duration of the pain ranges from the extremes of a child permitting injections in both eyes in a bad case of double interstitial keratitis, without moving a muscle or making the slightest moan, to an adult howling from its use in one eye.

**Reber** was in the habit of subjecting all his cases of hypopyon ulcer of the cornea at the Philadelphia General Hospital to subconjunctival injection of a one to one thousand solution of bichlorid of mercury, and the results excelled those obtained by any other method. Oxycyanid of mercury he preferred to use in greater dilution, one to five thousand or one to eight thousand; and this solution was reserved for choroidal lesions, in which it was valuable if the lesions were recent and



not due to tuberculosis. He obtained anesthesia in such cases with four instillations of a four per cent solution of cocain, followed by three to four minims of one per cent acoin solution; five minutes after which fifteen to twenty minims of the mercurial agent were introduced.

**Lamb** has found satisfaction in the use of salvarsanized serum injected subconjunctivally for a variety of syphilitic eye conditions, including iritis, iridocyclitis, keratoiritis, and interstitial keratitis.

**MYDRIATICS.** The occurrence of undesirable results from the use of atropin is reviewed by **Matthews**. He reports the case of a woman of seventy-one years, who, twelve hours after a cataract extraction and the subsequent use of a drop of atropin in the eye, became very sick and faint, complained of difficulty in swallowing, and developed dyspnea. The breathing was of the Cheyne-Stokes type. She recovered after treatment by strychnin and other remedies ordinarily used for collapse.

A case of duboisin poisoning is reported by **Northrop**, in a woman of twenty-six years. The patient had an indefinite history pointing to tuberculosis, with a positive tuberculin reaction. A year previously the urine had been found perfectly normal. Homatropin having failed to produce satisfactory cycloplegia, a solution of duboisin, one-quarter grain to one dram, was used, one drop in each eye three times daily for two days and part of another. On the afternoon of the third day, vesical tenesmus developed and pure bright blood was passed from the bladder. The urinary condition lasted for almost a week. The temperature rose to 102 degrees and the pulse to 112, and there was vomiting. After a temporary improvement a recrudescence occurred, with severe pain, severe hemorrhage from the urinary tract, temperature of 105 degrees and pulse 140. The symptoms gradually subsided under medical treatment.

**SILVER SALTS.** **Diaz Rodriguez**, desiring to use iodid of silver in the treatment of opacities of the cornea,

found it convenient to prepare the following solution: Iodid of silver one gram, twenty per cent solution of sodium hyposulphit ninety-nine grams. The iodid of silver is insoluble in any of the liquids ordinarily used in preparing solutions for use in the eye, and the strength of sodium hyposulphit given is the least amount sufficient for preparing a one per cent solution of the iodid of silver.

**Paradies** employs a singular combination of drugs in what he calls antagonistic therapeutics, for the treatment of conjunctivitis which is refractory to specific chemotherapy. At the office two or three drops of a 5 to 10 per cent solution of dionin are instilled into the conjunctival sac, after which one or two drops of a 0.5 to 1 per cent solution of argaldine are instilled. On days alternate with this treatment a 0.3 per cent ointment of corrosive sublimate is employed in the conjunctival sac.

**ANTISEPTICS.** A valuable review of the literature with regard to the use of ethylhydrocuprein in diseases of the eye is contained in the article by **Zentmayer**, who also reports briefly eight personal cases in which this drug was used for pneumococcus ulcer of the cornea. He regards ethylhydrocuprein or optochin as a valuable aid in the treatment of pneumococcal infections of the eye, the drug often acting as a specific in pneumococcal ulcers of the cornea, especially if the treatment is begun before active tissue destruction has occurred. **Basterra y Santa Cruz** gives a useful discussion of the therapeutic value of ethylhydrocuprein in ophthalmology. He concludes that it is the best treatment which we possess at present for combating pneumococcal serpiginous ulcers of the cornea. After its use the scars are smaller and less dense than after other forms of treatment. But in advanced cases the benefit obtained is little or none.

In Europe optochin has apparently been used rather extensively for the internal treatment of pneumonia. **Von Hippel** describes a case in which a man of sixty-two years was treated by his son, a physician, with 0.25 grams of

optochin six times daily. After two days of this treatment Von Hippel was called on account of disturbance of vision, which proved to be lasting in character. Von Hippel was able to collect from the literature about two dozen cases in which optochin was reported to have produced temporarily complete blindness; persistent disturbance being recorded in eight of these cases. He protests that the literature concerning the internal use of this drug treats the visual disturbances as accessory phenomena of little importance. He considers that the drug should not be recommended for use in general medical practice.

In the first of the two cases reported by **Pincsohn**, the cloudiness of vision and marked contraction of the retinal arteries caused by the use of the drug disappeared rapidly and entirely after omission of the remedy. In the second case there was bilateral blindness, with contraction of the retinal arteries. Later on, the vision improved, but the visual field was contracted on both sides, the discs remained pale, and the narrowing of the arteries persisted. At the end of two months there was a complete return to normal vision, but the ophthalmoscopic picture was unchanged.

**Hesse** describes his results in the treatment of infectious ophthalmias with Merck's animal blood carbon. In five cases of acute gonococcic conjunctivitis, four in the new-born and one in a child of two years, the carbon was insufflated twice daily into the conjunctival culs-de-sac as far as the transitional folds. One hour later the cul-de-sac was washed out with a solution of potassium permanganate. After a few days the secretion had entirely stopped. There was no progression in a case which had developed an ulcer of the cornea, and the cleansing and epidermization of the ulcer took place with extraordinary rapidity. In three cases of membranous conjunctivitis the secretion dried up rapidly, and the membranes were rapidly thrown off. In an especially severe case of serpiginous ulcer of the cornea, with perforation imminent, and a hypopyon extend-

ing two-thirds of the way up the anterior chamber, perforation did not occur, and the ulcer retrogressed.

**ANESTHETICS.** **Darier** refers to experiments which have been made in a London laboratory with colloidal cocaine. Experiments on animals gave very favorable results as regards the absence of toxicity and the possession of excellent anesthetic quality.

**SYSTEMIC REMEDIES.** **Lamb** is enthusiastic concerning the effects of fibrolysin in various ocular diseases, chiefly those in which it is desired to promote absorption of exudates or inflammatory products. In some cases he instilled the drug into the cul-de-sac, while in others subcutaneous injections were given. The cases described include several in which hemorrhages had occurred in various parts of the eye, corneal ulcers, iridocyclitis, possible tuberculous keratitis, and choroiditis. Occasionally the subcutaneous injection was followed by marked depression. **Reber's** paper on some phases of modern ocular therapeutics discusses in a discursive way several measures of systemic treatment for eye diseases, including pilocarpin diaphoresis, as applied to retinitis pigmentosa, optic neuritis, and choroiditis; hormone or organotherapy; and vaccine and serumtherapy.

**McDonagh**, and at second hand, **Darier**, whose discussion of the use of intramine, a sulphur preparation, in the treatment of syphilitic conditions was referred to in the last volume of the Year Book (v. 13, p. 35), again discuss the subject, although as related to syphilis generally rather than especially to syphilitic eye diseases. McDonagh now favors the combined use of mercury and intramine, and lays special stress upon the value of the sulphur in intramine for the purpose of putting a stop to excessive systemic action of mercury where intensive use of the latter drug has been resorted to. Darier's consideration of preparations of arsenic occurs in a section of his compendium and repertory of ocular therapeutics, which is to appear in book form "after the war."

## OPERATIONS.

M. URIBE-TRONCOSO, M. D.

NEW YORK, N. Y.

In this section of the digest only general operative procedures are reviewed. All particular operations will be found under the heading of the portions of the eye on which they are practiced, or in connection with the diseases which render them necessary.

**STERILIZATION.**—For keeping the field of operation aseptic, **Dubar** recommends the use of a paraffin film (Ambrine). After thoroughly disinfecting the forehead and lids on both sides and drying the parts either with sterile compresses or with an electric dryer, a layer of ambrine is applied with a brush, first in the eye-brows following the direction of the hairs. The eye not to be operated is then closed and covered with a film of ambrine. The eye under treatment is painted with the brush from the aperture of the lids upward to the hair and down to the mustache, by centrifugal movements. Perforated compresses can then be fastened to the eye. This film is easily detached when desired. (See below Dressings, page 13.)

**LOCAL ANESTHESIA.**—**Seidel**, continuing his work on local anesthesia (Y. B., v. 12, p. 34), applies a similar method to the Kroenlein operation, in cases of orbital diseases in which the opening of the external bony wall is necessary. After disinfecting the skin with tincture of iodine, infiltration anesthesia is made with 6 ccm. of a 1 per cent novocain-adrenalin solution. The injection needle is then inserted at the upper outer angle of the orbit and 5 ccm. of a 4 per cent solution of novocain-adrenalin are injected, one after the other, into the anterior, middle and lower third of the inferior orbital fissure; 6 ccm. of the 1 per cent solution are then pushed on the posterior surface of the front-sphenoidal process of the malar bone, and finally the needle is carried from the lower orbital fissure to the lower outer angle of the orbit to a depth of from 3 to 4 cm. and 3 ccm. of the 2 per cent solution are injected.

After resection of the bone about 2 ccm. of the 2 per cent solution must be injected around the optic nerve near the apex of the orbit.

**Seidel** claims that this method is without danger, easy to perform and affords both marked freedom from bleeding and complete analgesia.

**Maddox** obtains contact anesthesia for the excision of tarsal cysts and even anesthetizes ocular tendons before the operation of advancement, by means of small discs, lint-like on the one surface and with an impervious backing of thin rubber on the other. The warmth of the eye makes the discs a little softer almost at once. In this manner the strength of the anesthetic is exerted in one way only, and replaces with advantage the small cotton swab soaked in cocain usually employed in minor operations. The discs are impregnated with 10 per cent cocain during manufacture and then allowed to dry. From a quarter to half an hour is necessary for the cocain to act.

In view of the pain which frequently accompanies the excision of the iris in glaucoma and even in cataract, **Santos Fernandez** advises subconjunctival injections of 1 per cent cocain solution made in the inferior fornix before iridectomy, trephining, Lagrange operation and even in cataract extraction. Chemosis in acute glaucoma does not contraindicate the injection.

**GENERAL ANESTHESIA.**—**Pottenkofer**, reviewing all the methods of narcosis, advises to mix great quantities of air with the chloroform in the beginning of the anesthesia, for which purpose he directs the patient to speak or count aloud. Post narcotic accidents, he says, can be prevented by the use of scopolamin-morphin.



**INSTRUMENTS.**—Finding it difficult to make the corneal section for cataract when the patient's eye is small and deeply situated, **Black** has devised a new cataract knife with the blade offset as shown in the illustration. One for the right and another for the left eye are necessary.

**Oda** uses a new fixation forceps for holding the lid in an everted position during the excision of the tarsus or retrotarsal fold. One blade consists of a broad, slightly round plate, and the other of a smaller plate with minute teeth.

In order to facilitate the application of the trephine, **Onishi** makes the excision of the corneal layers with a special knife of his own make.

**DRESSINGS.**—**Dubar** speaks highly of the advantages to be derived in ophthalmic practice with the dressing of ambrine (paraffin) devised by **Barthé de Sandfort** in 1902. He claims it is aseptic, does not soil the skin or the clothes, maintains an equal temperature slightly superior to the body, on the parts covered, is easily handled and specially easy to be removed. Moreover it assures the perfect occlusion of the covered parts without preventing perspiration, and preserves them from external contacts.

As it is not irritant it can be applied on fresh wounds, but the infected ones may also be treated successfully in this way. Its special indication, however, is in burns of the eyelids or face. After washing and disinfecting the affected parts, they are thoroughly dried with aseptic compresses or by means of an electric dryer. A film of paraffin is applied with a brush at a temperature of 50° to 60° Centigrade. When cold a thin layer of cotton is extended upon it, and fixed by a second application of ambrine. A large pad of cotton and a bandage may be applied afterwards.

In conjunctival and corneal wounds when symblepharon is imminent, **Dubar** advises the application of the paraffin film directly upon the raw surface in order to form a layer of a foreign substance which prevents the adhesions.

This dressing is recommended also in hordeolum to replace the old poultices, in blepharitis for making a mechanical epilation when the film is taken away, and in zona ophthalmica because its application quickly relieves pain. In gonococcal ophthalmia a shield is easily made for the good eye with a wire frame, gauze and ambrine. In cataract operations it affords a hard protective shield and avoids the compression of the eye produced by ordinary dressings. Finally, in plastic operations, dermic and epidermic grafts are kept in position and protected with the film.

**SPECIAL OPERATIONS.** — **CORNEAL GRAFTING.** **Teulières** and **Ourgaud** used the conjunctiva incised all around the cornea to keep in place and protect a corneal flap made by a piece of shrapnel in the eye of a German prisoner. The projectile cut away the anterior lamellae of the cornea without leading to perforation, and a tongue-shaped flap of corneal tissue, about 6 mm. long and 3 mm. wide, was produced, and remained adherent by a pedicle to the limbus. Although the patient was seen twenty-eight days after the injury, the wound was not infected. The corneal flap was thick and opaque, but after being replaced and kept in position by the detached conjunctiva sutured horizontally below and anchored to the sclera by two intrascleral stitches, the flap wonderfully regained a complete transparency; and at the end of one month only faint traces of the borders of the graft remained in the cornea. The pedicle attached certainly contributed a good deal to this ideal result.

**OPPORTUNE OPERATIONS.** — Against the opinion of **Valude**, who claimed that some operations are inopportune when performed on soldiers at the front or in active service elsewhere, **Chappé** thinks that the operation for strabismus, even when binocular vision is not reestablished, is useful because it removes an apparent defect of which the soldier takes advantage for asking to be placed in the auxiliary army. The diplopia which sometimes supervenes after the operation can be removed by

suitable orthoptic exercises or by a second intervention. Nebulas and leucomas of the cornea are also pretences for avoiding entering into active service in the army. One-sixteenth of the patients examined by Chappé showed this condition, which in some cases can

be greatly improved by iridectomy. The operation of pterygium is necessary in some soldiers for keeping them at the front; and in cases of transference into the auxiliary army on account of this ailment, may send back to the front many useful men.

## REFRACTION.

THEODORE B. SCHNEIDEMAN, M. D.

PHILADELPHIA.

This digest covers the literature referring to Physiologic Optics and the Anomalies of the Refraction and Accommodation of the eye and their treatment from January first to November thirtieth, 1917.

**BICYLINDRICAL REFRACTION.**—**Prentice** again emphasizes the fact that the dioptral formulæ established by him in 1888 are still the simplest extant for solving the problem of bicylindric refraction; they prove mathematically that superposed cylinders crossed at any angle are equivalent to some ordinary sphero-cylindric combinations. Every aspect of the refraction by bicylindric lenses will be found fully discussed in his treatise on Ophthalmic Lenses. Incidentally he calls attention to the fact that several authors have quite recently given the wrong formula for the horizontal and vertical refractive powers. For a cylinder whose axis is placed at an angle  $\beta$  with the horizon, the correct formula is:

$D_h \sin^2 \beta + D_v \cos^2 \beta = D$ , the maximum dioptral power of the cylinder at right angles to its axis. In this equation  $D_h$  and  $D_v$  designate the same dioptral factor,  $D$ , in the horizontal and vertical planes.

**OPTICAL GLASS.**—**Rosenhain's** Cantor lectures on optical glass, before the Royal Society of Arts, have been brought together in a pamphlet. The first lecture deals with the requirements of optical as opposed to ordinary glass, and gives some account of the tests with which it must comply. The remaining two deal with the progress of manufacture and the possibility of simplifying and rendering that process a more certain one.

A new department of Technical Optics is to be established in connection

with the Imperial College of Science and Technology, South Kensington, London.

**SKIASCOPY.**—**Blanco** gives a lengthy and complicated account of the phenomena of intraocular illumination in the shadow test, by the study of the image of the observer's pupil as formed in the observed eye, employing the analogy of sunlight falling upon the wall of a house when admitted through a door or other opening. The illuminated area of the wall shifts with the position of the sun in relation to the opening.

The same writer criticises the various appellations which are commonly applied to this test; he suggests a Spanish word "cineluzcopia," which term appears to connote both movement of light and also inspection and exploration.

**SUBJECTIVE TESTS.**—**Gradle** calls attention to the imperfections of the refracting media of the eye on the one hand, and the inflexibility of the laws of optics on the other, from which two factors results the inconstancy of the eye in its optical relation to the constancy of the rays of light. As, however, optical physiology is not strictly mathematical, nature aids by certain broad compensations. The character of these compensations is not fully understood, nor is their extent completely known, for it varies in each individual and never remains the same in any one person, from which it follows that the duty of the ophthalmologist is to corre-

late the optical constants of light with the optical inconstants of the eye, taking into due consideration the physiologic compensation of nature. It is these uncertainties which make refraction not a science, but an art and a distinctly individual one at that, permitting different methods for the attainment of the same end.

**Crisp** combines the use of the cross-cylinder and astigmatic dial in estimating the refraction. After obtaining an approximate estimate of the spherocylindric combination required, he employs the cross-cylinder to fix the axis exactly, and next estimates the two principal meridians with the astigmatic chart. He finds it advantageous at times to combine the chart and cross cylinder even more intimately by employing the chart itself for determining the strength of cylinder and direction of the principal meridians with the aid of the cross cylinder; the latter being used to discover what strength of cylinder makes the principal meridians of the chart most closely resemble one another; or if the axis is to be determined, which way the whole dial appears of more uniform intensity. In testing his own eyes, he finds it strikingly easy to detect the difference in uniformity of the lines by revolving a cross cylinder as weak as  $+0.12$  sph.  $\ominus -0.25$  cyl.

The essential point in what **Potter** calls his "comfort test" consists in having the patient wear, for trial for a short time, the combination of sphere and cylinder determined without a cycloplegic by means of a fogging method. For this purpose a large number of spherocylinders (something less than 200 pairs will duplicate practically every ordinary combination; a much smaller number if carefully selected will suffice), are kept at hand so as to be readily mounted in a temporary frame. With these the patient tests the result of the refraction as previously determined as to the comfort he derives from the glasses. The experience so obtained, whether the glasses give satisfaction or not, is to serve as an indication of the correctness of the results of the refractive test.

**TRIAL LENSES AND OPTOMETER.**—The principal features of the Bausch & Lomb Optical Company's new form of ophthalmic test lenses, as they are stated by **Poser**, are their small size—but 15 mm. in diameter—and their shape, being plano-convex, of uniform thickness, so that the principal points occupy the same relative position. In testing the refraction, the spherical surfaces are placed toward the patient's cornea; when a cylinder is required, its plane surface is placed in apposition with the plane surface of the sphere, thus securing the same distance between the principal plane of the two lenses. The same firm has introduced a portable ipto-ophorometer for which certain advantages are claimed. Ocular demonstration is required for a satisfactory comprehension of the instrument.

**CYCLOPLEGICS.**—The literature of the year exhibits an undoubted tendency in some quarters to question the necessity of a cycloplegic in estimating the refraction in every case in young persons. Writers, however, are inclined to generalities upon this subject, and show a lack of definiteness as to the indications in favor of, or against, the necessity of these agents. Several papers bearing upon the subject are considered below.

After laying down both the advantages and disadvantages of cycloplegia as an aid in the measurement of the refraction, and also the undesirable effects of cycloplegia, **Jackson** raises the question as to the possibility of satisfactorily measuring the refraction without such aid. Admitting the real difficulty to be "that until a cycloplegic has been resorted to, no one can know with certainty whether a particular patient can fully relax his accommodation or not, a single guess may be brilliantly accurate. Repeated guessing may arrive at a result nearly always correct; but if scientific accuracy is of sufficient importance, every method that conduces to it is worth using." He does not allow that the mere age of the patient, or the state of the refraction, whether hyperopic, myopic, or astigmatic (though the latter is an im-



portant indication for cycloplegia), nor even the presence of possible symptoms of glaucoma, are alone sufficient to decide the question. In his own practice he has been using cycloplegia in two-thirds of his patients under 40 years of age, in 6 per cent of those between 40 and 50, and in a very small fraction of 1 per cent over that age. He properly insists that the accompanying dilatation of the pupil magnifies the effect of the imperfect focusing, and so makes the subjective tests more exact. This is particularly valuable when astigmatism is present. He concludes that in this matter of the use of a cycloplegic, there is occasion for carefully considering all the factors in any individual case; there is need, not for rigid rules, but for the ripened conscientious judgment of the scientifically trained physician.

Tilderquist, while admitting that cycloplegia is the most exact method of determining the refraction, calls attention to certain difficulties and chances for error inherent in the method. These consist principally in the varying power of the ciliary muscle in the different forms of ametropia, being hypertrophied in hyperopia and weakened in myopia, so that over-correction is a common pitfall to which cycloplegic measurement may lead both in hyperopia and myopia. Considering that astigmatism shall be fully corrected except in special cases of very high error, he limits the discussion to the prescribing of the proper sphere. As regards hyperopia, the aim should be to give the greatest correction possible, as is generally practised in this country, so as to place the eye in as nearly a normal condition as possible.

The question then is how to determine after a cycloplegic how large a sphere the patient will accept with comfort. This may be settled by trying the patient out after the ciliary muscle has recovered from the cycloplegic. An objection to this plan lies in the fact that the advantage of more ready acceptance of the correction while the eye is more or less under the influence of the cycloplegic, is lost. Among the most important factors to

be considered in this connection are—Age: Children will accept a larger correction than adults. Occupation: Those who use their eyes a great deal for near work should be given a fuller correction than those who do not. Esophoria and exophoria: As the convergence is intimately connected with the accommodation, a fuller correction will be tolerated in esophoria where the relief to excessive strain of accommodation will tend to reduce excessive stimulation to the interni; the opposite is the case in exophoria, where a weaker convex lens is called for. Manifest hyperopia: Where a large proportion of the hyperopia can be made to become manifest a fuller correction will be tolerated than where this is not the case.

If it is difficult to secure definite rules as to the correction of hyperopia, it is many times as difficult to lay down definite laws for myopia. The factors involved are many, varying from the condition of the patient's eyes to that of the general health. After careful measurement of the accommodative power present, the basic principle to be followed is that the myope should be compelled to use as much accommodative power as is possible without doing damage, and this power should be increased by training. Two main considerations must be taken into account—age and the degree of myopia. The writer approves of the working rule in practice that in hyperopia the younger the patient the greater percentage of correction will be tolerated. Although the accommodative power of a child is high, the proposition of available accommodation is lower than in adults whose accommodation has declined with years. In myopia also the full correction can be borne in young subjects while an allowance must be made for a weakened ciliary muscle with advancing years. The writer then proceeds to give figures which are well shown graphically, in which the relation between the age, the degree of ametropia, both H. and M., and the strength of glass to be prescribed are set forth.

*Continued next month.*

# DIGEST OF THE LITERATURE.

## REFRACTION.

THEODORE B. SCHNEIDEMAN, M. D.

PHILADELPHIA.

(Continued from January issue)

**Crawford** has addressed a questionnaire to 90 eye specialists of this country asking their practice as to the use of cycloplegics in refraction. A large majority considered such to be necessary, though there was some divergence as to the proportion of cases in which it need be employed. Homatropin and atropin were the drugs used with very few exceptions.

In insisting upon the need of cycloplegics in refraction work, **Clarke** states that in the absence of a cycloplegic a different result can be obtained at every examination, as it is impossible to determine accurately the degree and axis of a weak cylinder. In proof of this he has carefully determined the refraction of many young patients before and after paralysis of the accommodation: in not a single case did the two agree. He maintains that inaccurate refraction which leaves a slight, but different error from that which was originally present, may cause eye-strain which had not been present before, because the ciliary muscle is now able to correct the new resulting error when it could not deal with the original larger one.

**CHANGE IN REFRACTION.**—**Risley** reports a case in which the refraction, from having been hyperopic astigmatism, developed into myopia of  $-4$  and  $-2.25$  respectively in the two eyes, with vision  $6/15$  and  $6/60$ , following increased tension with numerous exacerbations; and final almost sudden subsidence of the hypertension, in an aged woman subject to arthritis deformans. The change in the refraction was accompanied by obvious thinning of the anterior ciliary region and a groove like formation surrounding the cornea just back of the limbus with tension normal in both eyes. There

were no demonstrable changes in the crystalline lens to account for the increased refraction.

**MYOPIA.**—To cure myopia, **Bacchi** advocates progressive pressure in the antero-posterior direction by means of the apparatus of Roger d'Ansan with a view to shortening and widening the globe. He reports favorable results following a few sittings.

Among various phases of myopia brought to light in **Masuda's** statistics, the most remarkable is that in 20 per cent the myopia was found to be hereditary. Macular changes appear earlier and are usually of a more severe character in women than in men. Illustrations of various macular changes are appended. The vision with equal errors of refraction, and in spite of early and full correction, is apt to be lower in women than in men.

**Harriet Gage** summarizes a study of myopia, including myopic astigmatism, from the Massachusetts Charitable Eye and Ear Infirmary during 1915. Of 1,524 eyes the refraction was below 3D in 56 per cent; 20 per cent were between 3 and 6D, and 20 per cent were cases of high myopia (from 6 to 15D). Only  $2\frac{1}{2}$  per cent showed very high myopia, above 15D. Of 1,696 myopic eyes 54 per cent showed no astigmatism; 36 per cent presented compound myopic astigmatism, and 10 per cent simple. The same paper deals also with the age, sex, visual acuity, including the sociologic as well as medical aspects of such patients, and should be consulted in the original.

**Muirhead** opposes the doctrine that the action of the external muscles tends to raise the intraocular tension and to cause lengthening of the globe. He believes that the opposite is the case, in that the action of the muscles tends to

cause an antero-posterior flattening. When the recti are divided, the eye-ball moves forward, showing that it is held back by the tonicity of the muscles—an impulse not due entirely, he thinks, to the elasticity of the retro-orbital contents, but partly to the elastic recoil of the eye itself. Another argument which the author takes up is afforded by the change in the apparent size of objects. According to the usual hypothesis, pressure is greatest when the eyes converge. As the eye must elongate under this pressure the apparent size of the image should enlarge. The author states that it diminishes. The author is greatly opposed to full correction of myopia, holding that persons wearing a full correction are always uncomfortable and suffer from eye-strain. The above is a short résumé of some of the theses maintained by the author in his book. The reviewer believes that every one mentioned is inadequately proven and indeed leaves the question where it was. Those who desire to go into the subject from the author's standpoint must be referred to the work itself.

In view of the wide prevalence of myopia in Germany (each year about 9,000 recruits in the Germany army are held back on account of eye affections, the great majority of which are myopes belonging especially to the better classes), the military authorities have attempted, immediately after the declaration of war, to perfect the military education of the younger classes by training exercises (among other factors) of distant vision, estimation of distance, etc. In this connection **v. Ziegler** relates his personal experience in such training. He had the myopes remove their glasses and exercise their distant vision on targets successively smaller in size. At the end of 6 months all were able to recognize the smallest of the targets. Other exercises in different maneuvers in maintaining straight or oblique directions of march, parallel or perpendicular courses, etc., were also practised with success.

**ASTIGMATISM.**—**Nordensen** remarks that although the question, whether in

a given case the astigmatism should be corrected or not, occurs daily and is important and complex, it has been little debated in ophthalmic literature, and the text-books give only vague directions on the subject. (This may be true in Europe, but there is certainly no lack of literature upon the subject in America, in which country there is substantial agreement among oculists generally upon the point in question.—*Rev.*) This writer reviews the rules for and against the correction of astigmatism. In general, he thinks correction is needed only if it increases visual acuity, (i) where such increase is needed, such as may be called for by the individual's occupation or during the period of education in children. (ii) *Asthenopia*—chiefly of two kinds: (a) accommodative asthenopia. He refers this form to the contraction of the pupil which occurs during accommodation and improves definition by cutting off the peripheral rays; this advantage is obtained by some ametropes by excessive accommodation, bringing the p.p. too close and so interfering with sharpness of vision for near work. The patient therefore relaxes the accommodation, the size of the pupil increases, he reverts again to accommodation, and this alternation produces fatigue and strain. (b) *Eyelid Asthenopia*. This kind of asthenopia is due to strain of the orbicularis muscle, which can be used to correct inverse astigmatism by the pressure it is capable of exerting in a vertical direction upon the globe. As much as 2 or 3D. can be compensated in this way, but the excessive action of the orbicularis leads to fatigue. (c) Dangers to the eye involved by astigmatism, as favoring the development of strabismus or myopia. In nervous affections, such as epilepsy, migraine, headache, etc., the astigmatism should also be corrected. Among the contraindications he includes: the inconvenience of wearing glasses, when, for instance, one eye is normal and the other astigmatic; nonimprovement of visual acuity after the correction has been worn for some time; intolerance of correction, as in elderly patients in whom the principal meridians do not coincide



with the vertical and horizontal planes, etc., etc.

He rejects the view which has been advanced in recent years as a reason for not correcting astigmatism in children that the anomaly may even disappear spontaneously if it is left uncorrected.

**EFFECTS OF UNCORRECTED REFRACTIVE ERRORS.**—**Carhart** insists upon the necessity of careful examination of the eyes of school children, particularly those who appear to be deficient in their studies. He summarizes the result of the examination made 20 years ago, of 1,000 school children of various ages in two village schools; not only those suspected of ocular defects but all the children in the classes from kindergarten through high school. The children were largely American born, in whom the errors of refraction are less common and of lower degree than among a foreign-born city population. He found of emmetropia 13 per cent, hypermetropia 36.20 per cent, C. H. astigmatism 44 per cent, myopia 1.40 per cent, C. M. astigmatism 3.50 per cent, mixed astigmatism 1 per cent. The following table shows the percentage by ages of the various errors in the same 1,000 children:

	5 to 8 yrs.	9 to 12 yrs.	13 to 18 yrs.
Emmetropia . . . . .	10.00	16.43	14.33
Hypermetropia ..	53.48	37.27	22.87
C. H. astigmatism	33.48	40.05	58.55
Myopia . . . . .	0.87	1.85	1.17
C. M. astigmatism	71.74	3.01	5.26
Mixed astigmatism	0.43	1.39	0.88

The rapid decrease in the percentage of the short, immature hypermetropic eye as the child develops is strikingly shown in this table, as is also the irregular yielding of its structure as shown in the increase of astigmatism. In contrast with these statistics of the eyes of school children of all ages, the same writer has examined 87 children from the kindergarten and first grade of the public schools of New York. This survey, while it shows the existence of refractive errors even at that tender age, indicates that they do not occur in so great a percentage or to so high a de-

gree as in later years—thus demonstrating the effect of the school in augmenting such anomalies and the necessity of preventing the same as far as possible by appropriate correcting glasses. In 23 per cent of the same children the refractive error was sufficient to require correcting glasses.

**Wesseis** reports some interesting cases of refraction from thousands of children whose refraction he has measured as ophthalmologist to the Philadelphia Bureau of Health. In one family of six children, each had hyperopia of not less than 14 and not above 18D. In a colored family of myopes, the youngest of six had 6D myopia and 2 of astigmatism, again the oldest of eight had 17D of myopia with 3 of astigmatism. The highest myopia occurred in a child of 14 with —27D.Sph. combined with —4. cylinder. He urges that myopic children should be taught in special classes—as more important even than special classes for the mentally defective.

**Scott** calls attention to the relation of eye-strain to headache and other reflex nervous conditions. He makes a plea for the proper correction of ocular defects which lead to strain, and the evils that result from the growing tendency of state legislatures to permit this work to be done by incompetent persons. He details several interesting cases showing the good effect of correcting glasses in relieving various severe functional anomalies of nervous origin.

**Bruner** calls attention to the influence of errors of refraction, or failure in the power of accommodation, or muscular imbalance or weakness of the extraocular muscles as a cause of various forms of headache. He dwells upon the importance of slight errors as against high errors in the production of symptoms, and that the mere fact of normal vision with or without glasses is not proof in itself that uncorrected error is not present. He lays stress upon the necessity of a cycloplegic in young subjects, and sometimes too in older ones. In this connection it is necessary to bear in mind that a number of different conditions may co-

operate in the production of symptoms and that each and all of these should be investigated and receive attention.

**Corry** and **Shanker** emphasize, not to say exaggerate, the influence of eye-strain in the causation of local and general symptoms. They find "that not only the symptoms of watering of the eye, itching, redness, blinking, sneezing, intolerance of light, headache, burning feelings in the eyelids, head twitching, pain in the neck, vertigo, neurasthenia, and sexual impotence, etc., are due to eye strain; but also different varieties of conjunctivitis, acute and chronic, follicular conjunctivitis trachomatosum, eczematousum, pterygium, xeroses, keratitis, pannus, symblepharon, corneal opacity, episcleritis, iritis, cyclitis, choroiditis, glaucoma, cataract, retinitis, optic neuritis, amblyopia, ptosis, blepharitis, hordeolum, chalazion, trichiasis, entropion, blepharospasm, dacryocystitis, diplopia, squint, nystagmus, nasal catarrh and its complications, etc., are also directly or indirectly traceable to eye strain." They agree with Walter of Odessa that trachoma is not a disease *sui generis*, but expresses the reaction of the conjunctiva to various irritants, which irritant is, in their opinion, nearly always eye strain from refractive error or muscular imbalance. A considerable number of brief histories in support of their contention are appended.

**Kahn** writes a paper intended to give the general practitioner a few helpful hints and rules to judge the success or failure of the glasses prescribed. The practitioner should first of all have a thorough knowledge of the symptoms of eye strain,—a matter very generally neglected in medical colleges. He insists upon the advantage of spectacles over eyeglasses and upon the importance of correcting astigmatism. He goes so far as to say that "any lens that does not show an astigmatic correction is presumably incorrect." He gives a homely but striking illustration of the different kinds of refractive errors by comparing the eyes to a two-wheeled vehicle of which the wheels may both

be of the proper size, or both too small or too large, or one larger than the other, or one or both wheels elliptical in shape, in which latter case the long diameter of the ellipses may be parallel, or take any position whatever. He insists upon the value of a cycloplegic in measuring the refraction. He gives an explanation of the complaints which even properly fitted glasses may occasion when first worn, and the necessity of a little patience in becoming accustomed to the correction. For presbyopes he advises, besides a bifocal combination, a separate pair for prolonged near work. Finally, as the eye is a living, changing organism, and the correcting lens is unchangeable and stationary, he insists upon the necessity of repeated examinations, which are not to be regarded as a confession of unsuccessful previous refractions. **Hartshorne** emphasizes the close relations between the motor and sensory nervous supply of the ocular mechanism and the sympathetic system, and that ocular malfunction is a definite and frequent source of irritation of the sympathetic system resulting in symptoms of distant organic disorder.

**Koster** calls attention to the persistence of accommodation in certain elderly persons until unusually late in life, associated with asthenopia. He warns, however, that certain conditions such as senile myosis and incipient cataract may simulate accommodative power. He describes 4 typical cases in persons in the fifties and sixties who appeared to possess 3, 4, or 5D. of accommodation. He has no explanation to offer but thinks that the condition cannot be explained by von Helmholtz's hypothesis.

**ACCOMMODATION.**—**Kagoshima** found the amplitude of accommodation among young Japanese to be about the same as in Europeans. The remarkable feature of these studies was a sudden increase 0.6—0.7D. in girls between 15 and 16 and boys between 16 and 17.

**Fulkerson** advocates close cooperation between the dentist and the ophthalmologist. The Roentgen ray, he thinks, should be resorted to more



often in errors of refraction which correcting glasses do not relieve. The absence of cavities in the teeth is not of itself a sufficient criterion that there may not be an impacted molar or blind abscess that irritates just enough to interfere with normal accommodation. He reports in some detail a half dozen cases in which the symptoms of accommodative asthenopia were present, and which were not permanently relieved until abnormal dental conditions, as shown upon the skiagram (such as

blind abscesses, etc.), had received proper treatment.

**PRESBYOPIC LENS.**—**Hill** observes that the ordinary bifocal lens is of no use to the presbyope who uses a head mirror or head light. He accordingly advises that the segment 12 mm. in width by 24 in height be added to the center of the distance correction—an arrangement which offers all the advantages of the presbyopic glass plus ability to see at a distance by simply turning the head to one side.

## OCULAR MOVEMENTS.

WILL WALTER, M. D.

CHICAGO.

This part of the digest gives a review of the literature referring to its subject that has appeared during 1917 to the close of November. After taking up the different departments of the subject it gives a series of important case reports.

My conception of an Editor's function in framing a chapter covering his subject—and to be used in the year book of literature—is that it shall give the essence of all papers published in all languages so far as possible, and without regard to the editor's own ideas of their value. It is proper to leave this evaluation to the reader, who is thus free to determine for himself. But he should be given enough to enable him to so determine and should be saved unnecessary reading of detail, if the chapter fulfills its mission. In an occasional instance, however, the paper is but a review or does not disclose added experience, and in such cases only the title is given, although this plan has to be followed sometimes when the paper is not available for abstract.—(W. W.)

**SUMMARY OF PROGRESS.**—Some points in physiology have had free discussion during the year 1917, notably: (1) Binocular single vision and the function of the oblique muscles. (2) Some new developments in the study of nystagmus have been forthcoming, and the trend is away from the ocular and in favor of the aural origin of this malady. (3) There is an increase in the proportion of paralysis cases of all types and some interesting deductions from them. (4) The correction of annoying abducens paralysis by transplantation of outer bands of the vertically acting recti, thus converting them to abverting functions, has received considerable mention. (5) Reports of effects of war wounds upon ocular movements are beginning to show in the literature.

**ANATOMY AND PHYSIOLOGY.**—**Hopkins** states that, from many dissections of cranial nerves in domestic animals, he is convinced that the accepted de-

scriptions of the motor nerves are incorrect, in attributing two sources of nerve supply to the muscle retractor oculi found in lower animals. It is innervated exclusively by branches from the abducens. He reviews quite exhaustively the literature on the subject and quotes many authors. His dissections were upon the horse, ox, sheep, pig, dog, cat, and rabbit, and were done under a binocular microscope. He traces the nerves from their superficial origin in the brain to their respective muscles.

**Dodge** has made a contribution on Visual Motor Function which is of interest from the psycho-physiologic side. **Roelofs**' paper on the function of trochlear muscles is not available for abstract. **Stähli** has reviewed the advance in knowledge of the relationship of ocular movements and the ear. He speaks of the newer study as "Labyrinthine Ophthalmostatics." In rotation nystagmus the ear is responsible



for the first phase alone, the brain for the second. Influences of the ear also dominate certain features of miners' nystagmus as well as that of the blind. In his practice at Zurich he has encountered many cases of ocular tremor and pronounced nystagmus in healthy people. He used to ascribe these to difficulty in fixation of the eyes early in life but now believes the ear responsible even for these. The ear-eye movements are observed through nearly the whole animal kingdom, even in invertebrates, and this again indicates the dominance of the ear.

**Jones** asks the attention of the general practitioner, the otologist, the ophthalmologist, the syphilologist, the neurologist and the surgeon to recent work done on the ear. Only the turning and douching tests are discussed in this paper. The mechanism of the tests and the physiologic features are explained, and the conclusions as to the nerve pathway from the ear to the eye muscles are also given. The tests are of value to the ophthalmologist in diagnosing some eye muscle palsies and locating the lesions causing them. They may also be of use in cases of nystagmus. **George** endeavors to uphold his theory of oscillation of the eyeball with the macula as the fixed point, and to refute the paper of J. A. Ferree and C. Sheard. (*Y. B. v. 13*, page 58.)

**Blaauw** feels that the perception of depth may be as accurately measured as is visual acuity and criticises all of the authorities on the subject of binocular single vision. Also that the mathematic treatment complicates the question and that psychologic explanations are disguised metaphysics. It is a physiologic process. Wheatstone furnished the essential facts. Blaauw makes distinction between simultaneous vision with alternate macular perception, and binocular single vision. 1. He proposes the stereoscopic parallax as the proper test. 2. A close study will disclose cases with absence or imperfectly developed depth perception but without squint. 3. Its presence or absence may explain why results vary after correction of anisome-

tropia; hence: 4. The appreciation of the third dimension has practical value.

In discussion, **Lancaster** thinks the essayist has undertaken to prove too much in assailing so many authors and traces the evolution of binocular vision phylogenetically and the overlapping of the field in higher form and the development of fusion. Perception of depth is not ocular but psychic. Binocular vision gives a more acute sensation than when one image is suppressed. And when the object is viewed with convergence, and hence from different angles as between the two eyes, the images are combined in consciousness with the added property of depth,—the most delicate of our space perceptions. He does not rate the function very high, since when absent through loss of an eye, there is early adaptation and it is not long missed.

**Verhoeff** considers that the usual tests, as bird and cage and the like, are not tests of binocular vision; and calls attention to his previously described test employing two circles, one with two vertical lines through it and the other a single line bent in the middle. Subjects with binocular single vision see one circle with two lines bent in the middle. This picture exists in the brain and this evidences the existence of a center for stereoscopic vision.

**Stevens** calls attention to the inconsistency of the author's claims that the mathematic and psychologic theories fail to explain binocular single vision and then employing the binocular parallax test which is mathematic, and then approving Dove's experiment which employs no eye movement and is hence psychologic. Binocular single vision is a psychologic phenomenon upon a physical basis which every psychologic process has. In fact we employ both physiologic and psychologic processes and must call to our aid mathematic principles to explain their actions. **Valk** calls attention to the Pfalz stereo-scope as a better test than the author's. **Emerson** has found the Worth amblyscope the most satisfactory test.

**Theobald**, as a result of sensing varying shapes and sizes of images accom-

panying definite ocular movements, has concluded that the dominant function of the obliques is to hold the eye forward against the backward pull of the recti. Others have claimed that opposition to the backward pull of the recti was by bulbo-orbital fascia or check ligaments. Theobald claims that the subjective after images are over the oblique insertions in the globe, and stronger and larger where the rotations put the greatest protracting stress.

These claims did not meet with favor in the discussion, which was well balanced, each in discussion supplementing the others to disapprove the claim. Howe maintains that the anatomic arrangement of the obliques gives some forward pull, but offered specimens showing that the capsule forms a sort of cup covering the posterior part of the globe and this prevents retraction. Jackson affirms Howe's statement, adding that both the obliques and the recti draw the eye nasalward. The globe is not held in a fixed position in its hammock of fascia but rolls from side to side and up and down. Valk claims that the only function of the obliques is to maintain the vertical meridians in position and that they have nothing to do with movements.

Duane calls attention to the absence of protrusion of the globes in cases of ophthalmoplegia, and when doing a tenotomy of the inferior oblique no forward movement of the globe is manifest upon traction—the eye ball moves definitely upward. He emphasizes the thought that the obliques take part in all ocular movements.

Lancaster calls attention to the fact that the recti and obliques do not exactly neutralize each other. Opposed to their combined action is a component of fascia and connective tissue and not the single band or check ligament, else there would be limitation to the degree of motion. The ocular muscle could rotate the eye much further except for this tissue. The tropometer measures, not the power of the acting muscles but the resistance of the antagonistic muscle and the fascia, ligaments, optic nerve and surrounding tissues. All muscles including antago-

nists are concerned in any ocular movement.

Will Walter agrees with Duane and emphasizes that protraction is not a prominent symptom of paralysis of recti, nor does retraction follow paralysis of the obliques. The researches of Fuchs, although made for another purpose, also militate against the view of the author, since in myopic eyes which are prominent the obliques have less forward pull and act more as rotators than in normal eyes. This is due to their insertion in the hind external quadrants. Hyperopic eyes are retracted though their insertion is such as to give a more forward and a less laterally acting pull. If the sensing of images upon rotation proves anything it is only that the obliques take part in all rotations. (This discussion seems to disprove the claim of the author and to establish the fact that the obliques are adjuvant, steadying, corrective muscles taking part in most if not all ocular movements. (W. W.)

**Landolt** has studied false projection in nondeviating eyes, and cites three cases in which the rotations were measured and compared with projection. The first had esotropia, O. D. fixing and O. S. showing limited rotation. O. D. showed false projection of  $6^{\circ}$  to the right but after seventy-two hours occlusion the test was normal. The second had  $18^{\circ}$  of left esotropia and showed in O. D.  $10^{\circ}$  to  $5^{\circ}$  of false projection to the right, and in O. S.  $4-5^{\circ}$  to the left. The third case showed false projection of  $6^{\circ}-8^{\circ}$  in the fixing eye. **Koster** describes an abnormal ocular movement evidenced by divergence upon voluntary lateral rotation without change in accommodation. The malady indicates separate centers for convergence and for lateral rotation.

**INSTRUMENTS.**—**Lowell** reviews the operations for partial tenotomy offered by Verhoeff in 1903, Todd in 1907, Harman in 1913, and presents a double-jawed fixation forceps to lessen the difficulties of these operations. All cuts in the tendon or muscle are made between the toothed jaws of the instrument. It is made by Codman & Shurtleff, of Boston.



**DIAGNOSIS.**—**Santonoceto** reviews the work of Howe with the Ergograph. **Roelofs** thinks he has a more precise method of measuring paralytic imbalance employing the Maddox Rod. **Antoni** considers the diagnostic import of abnormal conjugate ocular movement.

**Suker** has written an article describing a new muscle symptom diagnostic of exophthalmic goiter, and which he calls "deficient complementary fixation in lateral eye rotations." The sign is made manifest by having the eyes fix an object in extreme lateral rotation, either right or left, then upon rapidly moving the object to the median line notes whether one eye lags in following the object, shown as a transient divergent strabismus. An esophoria decreases the apparent divergence while an exophoria increases it. The diverging eye eventually jumps to proper convergence. The object must be held three or four feet from the patient. This sign is of no value in the presence of a paresis, a paralysis or any marked degree of esophoria or exophoria. **Suker** finds it is about as constant as the von Graefe or Moebius sign. He believes it is due to the same cause as the latter sign, i. e., a dissociation in the functions of the sympathetic and the extra ocular motor nerves.

**Berry** has observed that the pupil contracts when viewing moving, more than still pictures, and when there is a flicker in the motion picture the pupil can be seen to tremble, an effort to follow each fluctuation. He believes this will eventually injure rather than strengthen eye muscles.

**Rousseau** reviews the cases from literature and seen in hospitals presenting ocular muscle paralysis complicating otitis, and endeavors to show association of definite paralysis with localization of lesions. Following is the summary:

Isolated paralysis of abducens—benign—serous meningitis.

Fatal cases—extra dural and cerebellar abscess.

Paralysis of abducens and fifth—benign—osteitis.

Fatal cases—localized meningitis or

extra dural abscess, generalized meningitis.

Abducens and Ocular Motor Paralysis—cavernous sinus thrombosis (Generalized meningitis).

Oculo-Motor paralysis—temporo—sphenoidal abscess.

Paralysis of fourth pair—almost unknown.

**PHORIAS.**—**Kellogg's** paper is on exophoria. **Willetts** treats of the cause, significance and effect of heterophoria on the general system. He defines heterophoria as "simply a functional impairment of the action of one or more of the ocular muscles." If the equilibrium of the eyes is disturbed and binocular vision maintained with difficulty, there is disturbance of the general nervous balance. The causes of heterophoria are metabolic, anatomic,—as errors of attachment and malformation; and pathologic—as paralysis and paresis. Heterophoria produces vague symptoms filling the patient with dismay and concern, and "their significance and effect on the general system is apparent by disturbance of internal functioning organs, autointoxication and ill-defined sthenic conditions."

**Willetts** classifies muscle deviation as dependent upon (1) cerebro-psychic exhaustion; (2) lesions along the nerve tracts, (3) anatomic, skull and orbital malformation, false insertions, etc.; (4) compensatory muscle hypertrophy and muscle degeneracy. He feels that these patients themselves must be classified as well as the heterophorias; and that the correction by lenses or prisms will not avail in the presence of cerebro-psychic exhaustions; and he questions the value of prisms for constant wear since they are liable to increase the deviation they are designed to correct. Neither do prism exercises find favor with him, except in cases of weak muscles following paralysis or paresis or any cases of muscle degeneracy. In cases of orbital malformation false attachment of ocular muscles are compensatory and hence normal for that eye. He speaks of **Reber's** theory of skull and orbital changes and **Will Walter's** suggestion of overtonus as



both clearing the not previously understood changes at puberty.

He asks whether it is not logical to isolate patients suffering from asthenopia and eye distress in a dark room for a week under cycloplegia. He would change the designation of low degree prisms upon prescriptions for opticians, as suggested by James Wallace some years ago, and gives figures for this method of prescribing.

**TROPIAS.**—**Kimberlin** calls attention of the general practitioner to the cross-eyed child. He discusses one cause only, that of over convergence due to excess of accommodation. Three direct effects of squint are considered important, viz., (a) Cosmetic, (b) lack of binocular vision, (c) blindness. He employs the usual means of non-operative correction, but does not believe glasses advisable until two and a half or three years of age.

**Cutler** finds that most infants are hypermetropic, leading to excess of convergence and esotropia; alternating if vision is equal in both eyes, unilateral if unequal. Myopia rarely occurs in infants but is prone to develop during school age, accommodative divergence accompanying it. Myopia cases require full correction under atropin and fusion center training. If operation is ever needed it should be advancement of one or both interni. Heredity should be expected to play a part in strabismus since errors of refraction are so influenced. **Cutler** uses all the usual means of correction of these cases, refraction, atropin in the fixing eye, occlusion, operation and hygiene. **Poyales** writes on Convergent Strabismus in the New Born.

**Clothier** presents his paper, not because he has anything new to offer, but because there seems to be a prejudice against the early treatment of squint. He reviews the economic loss which results from this, as well as the loss in vision. He employs the usual non-operative treatment including the amblyoscope. This paper does not touch upon operative treatment. **Veasey** regrets that the increase in standards of medical education have not brought out the importance of early recognition of

squint. He wishes the family physician to refer them early to the specialist. He refracts his cases and gives glasses early and if too young uses atropin in the good eye. If no improvement is noted after wearing glasses a few weeks he uses orthoptic exercises. If no result is then obtained he operates, —usually about the sixth year of age. **Stapleton** reviews strabismus for the general practitioner.

**Maddox**, in doing advancements, clips the tendon stump at its insertion with the scissors, and then rapidly cauterizes it, not letting the heat penetrate the globe. He believes that by this the new attachment is firmer and better fixed at the site of the old insertion. He advocates surface cauterization in tucking operations also, in place of scraping the tendon.

**O'Connor** reviews briefly his shortening operation (Y. B. v. 11, pp. 78, 80; v. 12, p. 69) and tabulates the results of some forty operations. One of the claimed advantages is that it may be employed at any age. The operation is still in its developmental stage. He uses no binocular and occasionally no monocular bandage. **Larsen** writes on Operation for Convergent Strabismus.

**Hulen** believes lenses should be prescribed in squint as early as six months, and that by the age of four all nonoperative measures shall have been tried, and operation is then indicated if the squint persists. He disagrees with **Reber** who says 14-16 years is the ideal age. Tenotomies are inadvisable as are all operations which involve the cutting of the tendon from its attachment. He then describes his method offered in 1910 (Y. B. v. 8, p. 74). A general anaesthetic is used in children. One of the advantages claimed for the method is the employment of traction sutures which are left in until the following day at least; then, if overcorrection has taken place, the tight sutures may be removed and the traction sutures tied to hold the correct position.

**Briggs** presents again his operation for tendon shortening first described before the A. M. A. in 1909 (Y. B. v. 6, p. 105), employing the silver link to clamp the folded tendon. He has now

done 131 such operations with failure in but three. In one of these the link was lost, in the second it was imperfect and failed to hold, and in the third the clamp forceps was defective. The results of the method itself may therefore be placed at 100 per cent. In some cases where secondary advancements were necessary it was found always that the tendon had adhered to the sclera just back of the original insertion.

Will Walter, opening the discussion, approves of any method which does away with the unsurgical procedure of sutures under tension, and recites the fact that the O'Connor loop operation, the tendon tucking methods and immobilization by bandaging all tend to lessen this tension. He briefly outlines his method of accomplishing this by twisting the two portions of the split tendon over gold tubes. The tubes are twisted in opposite directions and held together by a gold pin and all buried under the conjunctiva and left a long time. There are no sutures employed in this. He thinks the silver links of Briggs may be better than his gold tubes, but the principle of splitting the tendon and burying the links seems better, since they may be left indefinitely and, moreover, by this method, tilting of the meridians could be corrected.

Jervey has found Briggs' method safe, simple and easy. "Any deviation, no matter how great, can be corrected by it without injuring a tendon." Wells thinks details are so lacking in the report of 131 cases that judgment cannot be made. Todd has tried the operation on three cases and reports 100 per cent failure and fears it is a matter of his own technic. Macleish has done the operation with gratifying results. He found difficulty with the forceps and has had one made of his own design. Moore thinks there should be some way of measuring the mm. of tendon shortened, and makes a suggestion of a method. Briggs called attention to the fact that his forceps carry a marked scale for the purpose of measuring. He claims that his operation is suitable for any case where shortening is indicated and that the links now have burs on

them which prevent slipping. Briggs demonstrated this method of shortening at a clinic before the Eye Section of the Southern Medical Association.

**Wootton** finds that paralytic strabismus is rare in children. Convergent strabismus is much more common than divergent. Any operation should be designed to strengthen the muscles believed to be weakened by disease. In myopia with weak converging power, advancements of both interni are proper and usually give excellent results. In hypermetropia with divergence excess free tenotomies of the externi, repeated if necessary, are successful. In the first class of cases tenotomies of the externi, and in the second class advancement of the interni, would always result in failure. Cases of anisometropia cannot be prognosticated as well as the above. In the latter cases the muscular error should be attacked. **Mason** writes on Treatment of Concomitant Squint. **Bielschowsky** has reviewed some of the results of war wounds upon ocular movements. They are indirect results of fragments of bone, cicatrices, adhesions and traumatism generally and have not great significance except as medical war records.

**Woodruff** defines transplantation of tendons of the eye muscles as "transference of all or a part of a tendon from its normal insertion to a new one, in such a way that its physiologic function will be changed." The author has transplanted the outer halves of the superior and inferior recti to the sites of the externus in two cases of abducens paralysis, one of 20 and the other of 7 years of age. He exposed all of the muscle insertions, split the vertical recti backward about 12 mm. and sutured the outer bands to the insertion site of the paralyzed muscle, employing 00 catgut (treated with formaldehyde). Both eyes were bandaged three days, the operated eye seven days. In the first case examination showed improvement, but still some strabismus. Section of the remaining bands of the vertical recti for relief of the remnant of strabismus was of no avail. The cosmetic effect of the operation was better



in the second case. Both cases had amblyopia in one eye so that diplopia did not have to be considered.

Todd showed cinematographs of a case upon whom the operation was done, an extreme convergence, obscuring vision. The external rectus was absent. The result was much diminished convergence affording some motion and a degree of useful vision. A second picture demonstrated the value of advancement of the capsule in cases where the tendon attachment cannot be found.

Tenner has done the operation described by Woodruff upon a congenital abducens paralysis case, except that the internus was not tenotomized. The abnormal tendon strips were attached further than Woodruff has done. Severe reaction followed and some sloughing. Wiener has done the operation experimentally upon dogs and upon one case in man (external rectus paralysis), resulting in 20 to 30 degrees of power. Woodruff, in closing, would object to Tenner's advancement further forward and nonsection of the opposing muscle because of the tension upon the suture which must be minimized; and this is done by the method he has reported.

**NYSTAGMUS.**—**Lutz** briefly reviews the subject of nystagmus particularly unilateral, presenting a case of his own and appending two similar cases previously recorded. He disagrees with Arlt's opinion that the nystagmus would produce an enhancement of the peripheric images. Neither does he believe that in his case the movement is an intentional corrective movement as mentioned by Beard in his *Ophthalmic Semiology and Diagnosis*. **Dorff** reports two cases showing nystagmus when one eye is covered or the use of both eyes prevented, called by Fromaget "Latent Nystagmus." Refractive errors and heterotropia, usually convergent strabismus, accompany the phenomenon. Treatment consists of correction of the error of refraction and training of fusion if this is lacking. Operation for the squint is of cosmetic value only. **Gradenigo** writes of alternating monocular nystagmus.

**Yawger** rarely finds combined nystagmus of head and eyes, persisting during life and reappearing in consecutive generations. He presents an interesting history of such a condition in a Russian Jewish family, covering at least four generations and involving twenty-four people, not all of whom were affected. The characteristics of the nystagmus are noted but no record of visual acuity is given for any of the subjects since they objected to ophthalmic studies and Bárány tests.

**Ohm** has made a further contribution to miners' nystagmus. **Gowland** has written on voluntary nystagmus, and **Fromaget** wants to assign the name "latent nystagmus" to a variety, thus creating an analogy with latent strabismus. Six cases are cited in each of whom the nystagmus becomes manifest upon certain movements only. **Rochat** discusses the rapid phase of spontaneous nystagmus.

### CASE REPORTS

**Report I.**—**Linnell** believes that the influence of fusion upon muscular imbalance and asthenopia is not receiving enough attention. He uses training of fusion if other methods of relieving asthenopia fail, or at once if there is suppression of vision in one eye. The case of a neurotic girl is presented. She had been under treatment for two years by an oculist and showed an esophoria of 5 degrees at five meters. Refraction correction was unavailing. There was no binocular vision for near. For home use a stereoscope and series "A" of Dr. Wells' was given, and taper exercise for the interni. In two weeks she was able to read twenty minutes without fatigue and free from most of the symptoms, and was able to fuse all except three of the stereoscopic cards. She was later discharged with instruction to continue bar-reading an hour each day.

**Report II.**—**Stilwill** presents an interesting case of exophoria of twelve degrees, resulting from four to five operations by different operators, originally undertaken to cure an esophoria of twenty degrees. Both eyes have been operated and the patient has crossed



diplopia and nystagmus, and complains of headache and occipital fullness. The most annoying symptom is vertigo when fixing for distance. To get relief he wished enucleation of his right eye. Interesting features of like cases were brought up in discussion.

Report III.—**Bane** showed a patient, female, aged 21, with history of convergence of right eye since four years old. Before operation she had sixty centrads of convergence. Advancement operation, severance of the internal rectus and severance and advancement of the external rectus was done with satisfactory result.

Report IV.—**White** presented a woman in whom a well marked divergent squint with a marked upshoot of the right eye had been relieved by a tenotomy of the right inferior oblique and of both externi. The result, both cosmetic and subjective was remarkably good.

Report V.—**Jackson** presented a man, aged 21, who, two years ago, showed thirty-five centrads of divergence developed during the preceding five years. After a tenotomy of the right external rectus combined with an advancement of the right internal rectus, twenty-five centrads of divergence remained. Then an extended tenotomy of the left external rectus was done and the globe held in for thirty hours. There remain only four degrees of exophoria.

Report VI.—**Todd** presents a case of congenital insufficiency of the left superior rectus, with secondary deviation upward of the right eye caused by compensatory overaction of the interior oblique, accompanied by head tilting. The case is illustrated with moving pictures. Under general anesthesia he did a complete myotomy of the right inferior oblique and two weeks later under local anesthesia the superior rectus of the left eye was shortened by tucking. The result was very gratifying, the tilting disappearing and parallelism obtained. Double vision did not return. Duane is freely quoted. Todd and Reber both believe these cases are more numerous than generally supposed.

#### NEUROLOGIC

Report VII.—**Santos Fernandez** reports seventy cases of paralysis of cranial nerves.

Report VIII.—**Crisp** reported a case of abducens paralysis in a man of thirty-seven years. "The fundus and vision being normal, and the only other symptom an aching of the back and left side of the neck. There was a history of a primary sore four years previously, and of treatment with one dose of salvarsan and subsequent inunctions. The Wassermann test had been negative on several occasions. During the two weeks since the first visit, the patient had been under mercurial injections intramuscularly, and there had probably been a slight improvement in the motility of the left eye. The patient's muscular reflexes and coordination were normal."

Report IX.—**Jackson** presents a man of 51 showing a convergence of sixty centrads in the right eye, with inability to bring the eye within fifteen or twenty degrees of the median line. Trouble followed an injury low down on the forehead a year before. Diplopia requires the constant covering of this eye. The use of slips from the superior and inferior tendons to attach to the external tendon was mentioned dubiously. The consensus of discussion on this case was that operation would not be successful. Covering the eye by a patch or obscuring vision by strong plus sphere was advised.

Report X.—**Leavitt** reports a case of recurrent paralysis of the right abducens nerve in a young woman of 23 years whose first attack occurred at the age of 1½ years accompanying measles. The attacks have occurred at intervals from a few days to thirteen months and are ushered in by severe headaches, chills and fever; sometimes nausea and vomiting. Whilst recovering a sensation of pressure is experienced in the paralyzed eye. In discussion the theories of recurrent abducens paralysis are brought out.

Report XI.—**Salomonson** reports bilateral ocular paralysis.

Report XII.—**Yzerman** records paralysis of right externus with otitis and mastoiditis.

Report XIII.—**White** presents a boy with a complete congenital paralysis of the left superior rectus for which he had done a tenotomy of the right inferior oblique. A partial success only had been obtained, showing the limitations of the tenotomy. The deviation was reduced from 37 to 27 degrees, the marked upshoot of the right eye was almost abolished, but there was still some head tilting. It was proposed to obtain further correction by advancement of the left superior rectus. Dr. Duane remarked that the results of tenotomies in these cases varied greatly, and in a similar case a tenotomy had produced all the result that could be desired.

Report XIV.—**Grossman** presents ophthalmoplegia interna in a syphilitic family, consisting of the parents and four children all of whom present typical symptoms. All were put on anti-syphilitic treatment, some showing slight improvement, some continuing unfavorably. A short paper with some review of the literature accompanies the presentation of the cases.

Report XV.—**Moore** recites the case of a girl of 4½ years who suddenly developed ptosis a few weeks after an attack of measles followed by bronchopneumonia. There was also paralysis of the sphincter of the iris. Temperature was 102 degrees on the evening of admission to the hospital. Slight slurring of speech was noted. The fourth and sixth nerves were unimpaired. Ophthalmoscopic examination showed a thin choroid with a few isolated patches of choroiditis. Temperature gradually became subnormal and the lung condition grew worse. Diagnosis of tuberculosis was made and ten days after admission to the hospital the girl died of tubercular meningitis. Autopsy showed no involvement of the nucleus or of the intracranial course of either third nerve.

Report XVI.—**Castex** reports rare ophthalmoplegia of central origin.

Report XVII.—**Ishida** presents a typical case of Bell's phenomenon, in a man with ectropion due to a hot water burn. There was no disturbance of ocular movements, except rotation of the eyeball downward upon closure of the lids. A similar case following a Pagenstecher operation for ptosis is cited.

Report XVIII.—**Finlay** presents a case of paralysis of the superior oblique, following ethmoiditis.

Report XIX.—**Tuto** reports injury and paralysis of an externus.

Report XX.—**De Schweinitz** and **Spiller** present a case of complete external ophthalmoplegia immediately following a severe attack of coughing. The patient was a girl of four years. Neither eye could move up or down but there was rotation of one millimeter downward. The ciliary muscle was normal. Under KI, gradual improvement to normal took place, an intervening diphtheria being treated with antitoxin. Hemorrhage in the corpora quadrigemina with a lesion of the oculomotor nuclei is considered. An interesting feature is that the lesion was bilateral.

Report XXI.—**Verderame** has seen a sixteen-year-old boy in whom the head had a tendency to turn to the left side. The right eye was normal in all respects, but the left showed a convergent strabismus of 28 degrees with a slightly narrowed palpebral fissure. All movements of this eye up, down and inward were normal, but outward movement stopped at the median line with slight downward and inward rotation and slight elevation of the upper lid. Pupils were equal and reactions normal. Double vision could not be elicited. This case was operated by Gonin's advancement, the external rectus of the left eye being split backward, the posterior end of the split portion being tied to the tendon stump and the two anterior ends sutured high and low to the limbus. The final result showed strabismus of four degrees. The literature is reviewed.

Report XXII.—**Mardellis** cites an unusual case of abducens paralysis in a man of 40 years; following violent



traumatism of the left mastoid, orbit and jaw bone accompanied by evidence of deep injury, nasal and aural hemorrhage. Nothing remained of the injury but the abducens paralysis.

Report XXIII.—**Emmert's** case of amaurotic ophthalmoplegia occurred in a woman of 60 years who complained of an itching in the left eye and dimness of vision lasting six months. Vision was  $2\frac{1}{2}$  per cent with slight swelling of disc and arteries somewhat narrowed. When seen five months later she showed total paralysis of left eye, except the superior oblique, complete ptosis, bare light perception and slight bulging of the globe. The fundus showed; atrophy on the inner side, slight swelling of the disc, and some obscuration with veins bulging. Roentgen ray showed no tumor. Wasserman negative. General health good. About one year later this eye was enucleated. Nothing was found in the orbit and nothing abnormal in the eye. Except for the ptosis the patient is now perfectly normal. Emmert makes no diagnosis, but locates a probable causative lesion somewhere between the optic chiasm and the orbit.

Report XXIV.—**Zentmayer** gives the history of a girl of 5 years who shows complete paralysis of the left external rectus. All movements except inward are normal. No retraction in adversion. Fundus normal, H. 5. D. The squint was noticed immediately after birth, and the child's mother shows a complete paralysis of the left external rectus, with other movements and fundus normal. O.D.—2.00 D.; O.S.—4.00 D. Her squint also was noticed immediately after birth. The child's grandmother, aged 61, showed upon examination exactly the same muscular condition as existed in the mother and child, O.D.—12.00 D.; O.S.—3.00 D. The grandmother was one of seven children; she alone being affected. She is also the mother of three children only one of whom was affected. The patient presented is an only child.

#### NYSTAGMUS

Report XXV.—**Witmer** cites the record of a young man of nineteen who

has always had divergent squint in the left eye. Vision was good until four years ago, when, following a fever, it became impaired and nystagmus appeared. Upon looking to the right the eye goes down and is retracted about three millimeters, and nystagmus is manifest in both eyes. A tenotomy of the external rectus shows this muscle to be a tendinous inelastic band, and an advancement of the internal rectus shows this muscle to be an elastic band with some muscle tissue, though with doubtful contractility. The etiology of this condition is shown by the writer and the literature reviewed.

Report XXVI.—**Boyd** presents a patient who formerly had a paresis of the superior rectus muscle of one eye and now has a rotary nystagmus of both eyes, with the quick component directed to the left.

Report XXVII.—**Lutz** reports a case of unilateral vertical nystagmus in a woman of 39 years. This began at the age of thirteen when brick dust entered her left eye. On removal of the bandage she saw all objects dancing before the left eye, and this has continued ever since. The motion is unilateral, vertical, pendulum like, more pronounced in the primary than in the terminal position, is 2-3 mm. in extent and 2-3 per second. In early childhood she suffered from an inflammation of the optic nerves, and the accident later coming in an already predisposed eye is thought to have produced the nystagmus.

Report XXVIII.—**MacKenzie** presents a long, classical paper on "after-turning" nystagmus, covering his investigation of eight years; and his findings are contradictory to those of Bárány. He gives the results of his examinations in one hundred and seventeen cases, all of which are appended separately. While giving all due credit to Bárány, he believes the latter's technique faulty. His differences consist: (1) in the length of time of the average and maximum durations of horizontal after-nystagmus; (2) in seeing no case with absence of nystagmus; (3) more consistent results in reexaminations;



(4) less variation after rapid and slow turnings; (5) in finding results more reliable after twenty turns than after ten turns; (6) more nystagmus after twenty turns than after five turns instead of an equal amount; (7) he has never seen a case of "after-after-nystag-

mus" and does not believe it exists. His dancer case supported the claims of Bárány as regards turning dancers. The paper is a valuable contribution to the subject and should be read in the original, as it does not lend itself to abstracting.

## THE CONJUNCTIVA

WM. ZENTMAYER, M. D.,

PHILADELPHIA.

This section reviews the literature relating to the conjunctiva and its diseases appearing during 1917 up to November 30.

**DIAGNOSIS AND DISTRIBUTION OF CONJUNCTIVITIS.**—A timely editorial on the importance of a careful differential diagnosis in cases of supposed conjunctivitis appears in the *New York Medical Journal* (v. 105, p. 367). **Elliot** saw, in the Government Hospital at Madras, from 30 to 50 or more cases of catarrhal ophthalmia in a single morning, and as similar conditions exist throughout India he points out how difficult it is to form a true conception of the enormous mass of conjunctival disease prevalent. The treatment of these cases is largely in lay hands. The common ingredients used are the juice of the leaves of the tamarind tree, the juice of fresh limes, alum, various kinds of peppers, iron filings, human milk, human urine, cow dung, ghee (clarified butter) and a great variety of other substances. The results are disastrous. Granular ophthalmia takes an appalling toll of human sight in India. As the result of his enormous experience **Elliot** states deliberately that this disease should never be permitted to cause the slightest diminution in visual acuity if treated from the first.

**Eason**, in his report of the ophthalmic cases seen in Cairo and Alexandria in the first six months of 1916, states that conjunctivitis has regularly caused about 10 per cent of the ophthalmic cases in the British hospitals. The two main varieties were the K.-W. and the

M.-A. The clinical aspect of the cases presented nothing unusual except for the occasional severity of a K.-W. infection. Recent cases of trachoma were rare and sporadic, which contrasted with the universality of trachoma infection among the natives of Egypt, speaks volumes for the personal cleanliness and sanitary arrangements. **Gibson**, in his report on the Ophthalmic Hospital at Lemnos, speaks of foreign bodies in the conjunctiva, pterygium, conjunctivitis—catarrhal, phlyctenular and traumatic, as occurring amongst the troops.

**OPHTHALMIA NEONATORUM.**—From the final report of the Royal Commission on venereal diseases of the United Kingdom (*Brit. Jour. of Ophth.*, v. 1, p. 390), and from the appendix and the discussion which followed its presentation, the following abstracts are of interest. Regarding the value of notification in ophthalmia neonatorum, **Cross** thought that it already had accomplished something and believed that through this measure it would ultimately be stamped out. **Jessop** approved of notification, but did not think it helped much to reduce the number of cases. **Harman** was of the opinion that it served two useful purposes; first, it made medical men and midwives more careful; and, second, it rendered speedy treatment of the cases much more likely to be secured. **Newsholme** laid down as a principle that "the advisabil-

ity of notification in any disease is conditioned on its associated circumstances." Gregory stated that since notification by midwives had been enforced there were fewer cases. Chalmers has found that there is a certain family predisposition to the disease which suggested the advisability of treating the mothers for the underlying complaint, and it has been found the worst results occurred in cases complicated by congenital syphilis. **Figueras Parés** has written a general article on gonococcus ophthalmia in the newborn.

**OPHTHALMIA NEONATORUM OF NON-GONOCOCCAL ORIGIN.**—**Thompson** emphasizes the importance of the dissemination of the fact, that quite a large percentage of cases of ophthalmia neonatorum are of nongonococcal origin. He considers it quite safe to look upon as gonococcal, all acute blennorrheas in infants five or six days old, when the flow of pus is excessive and the lids greatly swollen. He states that he has never cured a case of this kind in less than three weeks and accepts the view of Roemer that it is a selflimited disease.

**TREATMENT OF OPHTHALMIA NEONATORUM.**—The following account of the method of preparation of Nicolle and Blaziot's vaccine which **Delorme** says that he used successfully in the treatment of ophthalmia neonatorum is given. (See Y. B. v. 13, p. 94.) These investigators found that another coccus beside the gonococcus was present in gonococcal ophthalmia; to this they give the name of synococcus. The vaccine is made as follows: A pure coccus, which has been induced to grow on a medium relatively poor in serum, and also a synococcus are inoculated on separate tubes of a medium consisting of meat broth 100, urea 0.4, glucose 2, phosphate of ammonia 0.05, sea salt 1, agar 1.5, to which is added in the tubes 0.5 c.c. of rabbits' serum to each 5 c.c. The synococcus tube receives no serum. The cultures are removed from the incubator after 24 hours, emulsified in 0.7 per cent solution of fluorid of sodium, washed and centrifuged.

The vaccine is made of nine parts of

synococcal culture to one of gonococcal, and triturated to contain 500 million microbes per c.c. The vaccine is kept for 48 hours in the ice chest to destroy the vitality of the organism. The dose is 0.5 c.c. diluted with 1 c.c. of normal salt solution and is given intramuscularly.

**Stein**, from an experience of four years in its use, believes sophol "four times as efficient as a prophylactic as compared with nitrat of silver." To obtain this efficiency a proper technic in its employment is necessary. Two persons are required, one to pry apart the lids using small pledgets of gauze or cotton, the other to administer the drug. One drop of a 5 per cent solution is instilled directly into the eye and a second drop placed at the inner canthus when the lids are closed. The latter is to insure disinfection of the lid margins.

**PNEUMOCOCCAL CONJUNCTIVITIS.**—**Brownfield's** patient was a Mexican boy 12 years of age. Both eyes were affected. The lids were so swollen that the cornea could not be examined. The entire conjunctiva was coated with a white fibrinous exudate. There was very little pus. The cervical glands were swollen. Cultures from the eyes and throat were negative for Klebs-Loeffler bacilli, but showed pure cultures of pneumococcus. The temperature was 102.6 degrees. Despite appropriate treatment, including ethylhydrocuprein and pneumococcus vaccine, symptoms of meningitis developed on the 13th day, and death resulted on the 18th day. No autopsy was obtained.

**Clapp** reports a case, which is of interest because of the chronic nature of the disease, and the death of the patient. The conjunctivitis had persisted for 18 months, during which time no definite organisms were discoverable. However, during a recurrence three and one-half years later pneumococci were found in a smear and culture. Following treatment with vaccines, which resulted in a great improvement in the conjunctival condition, the patient developed a fatal attack of pneumonia.

(Continued next month)

# DIGEST OF THE LITERATURE.

## THE CONJUNCTIVA.

WM. ZENTMAYER, M. D.

PHILADELPHIA.

(Continued from February issue)

Gill reports an epidemic of pneumococcic conjunctivitis occurring in Buenos Aires during August and September, early spring. Sixteen cases are included, the patients ranging in age from 13 to 40 years. The treatment consisted mostly of applications of silver nitrat and formaldehyde solution. All recovered promptly.

**DIPHThERITIC CONJUNCTIVITIS FOLLOWING SQUINT OPERATION.**—Taylor saw diphtheritic membranous conjunctivitis develop in an eye two days after an advancement operation with tenotomy. The patient, who was a girl of 11 years, had diphtheria a few months before, and there was a baby in the house who was a diphtheria bacillus carrier. Recovery took place under antitoxin, and quinin lotion, but not before the external rectus had sloughed.

**'SQUIRREL PLAGUE CONJUNCTIVITIS.**—A case of this affection is described by Lamb. (See Y. B. v. 11, p. 128.) The patient was a colored girl. Two days previous to the onset of the conjunctivitis the patient had prepared rabbit for the table. Guinea pigs inoculated with the secretion from the affected eye died on the fourth day; and the bacillus tularensis was isolated from numerous miliary abscesses in the liver and spleen. The case was treated locally with boric lotion and cold compresses. An autogenous vaccine was administered and seemed to do much good. Recovery was complete by the end of the fourth week.

**INFECTION OF CONJUNCTIVA FROM CATS.**—Lawson records three cases in which intense conjunctival conditions were traceable to infection from the fur of cats. All occurred in children of well-to-do parents, whose homes were of the cleanest and best. In one case

the organism found was the staphylococcus pyogenes aureus. In the second, the condition resembled tuberculosis of the conjunctiva. The organism common to the secretion and the skin of the child's pet cat was a streptococcus. In the third case there was a tuberculous conjunctivitis and adenitis. Abundant tubercle bacilli, of the bovine type, were recovered from both sources. No opportunity was afforded for bacteriologic examination of the cat.

**OPHTHALMOMYIASIS.**—Maggiore records having seen this rare affection in a child of eight months. The superior quadrant of the bulbar conjunctiva was covered with large veins separated from one another and located in both the conjunctiva and episcleral tissue. The conjunctiva appeared raised and transparent as from edema. In the upper part, adherent to the sclera, there was a thread-like structure 3 m.m. in diameter and 1 c.m. long, shaped like a cigar and somewhat arched as though to correspond with the margin of the cornea, from which it was separated 3 m.m. With the corneal microscope it was found to be a parasite. There was a transparent connective tissue sheet by which it was attached to the sclera. Grassi pronounced it to be the larva of a fly, but was unable to decide the precise variety. There was no history of a sting and no inflammatory symptoms as in other reported cases.

**STREPTOTHRIX OF THE CONJUNCTIVA.** Pereyra describes what he considers to be a unique case of nodular affection of the conjunctiva due to streptothrix. The patient was a nine-months-old child whose father had suffered from trachoma and in whose family history there was a suggestion of tuberculosis. A month before the onset of the ocular condition the child had suffered some



throat affection for which antidiphtheritic serum was given. The author's summary as to this condition is as follows: There exists an ocular disease (streptothricosis) of the conjunctiva, characterized by the presence in the palpebral conjunctiva of nodular formations of two types. The more voluminous are pedunculated but not ulcerated, and have a smooth surface of red color with small yellow spots. Others are formed by the grouping together of small nodules of a grayish color, the size of a pin-head. The pathogenic agent is the streptothrix similar to the streptothrix violacea. The granuloma due to the streptothrix is composed of numerous giant cells, scattered in a tissue made up of epithelioid, lymphoid and polynuclear cells. Filamentary elements with ramifications are present (streptothrix). Surgical removal is not sufficient. Iodin internally and locally are required.

In **May's** case the conjunctiva alone was affected. The condition had persisted about one year. The conjunctiva of the lower lid of the left eye was markedly reddened and swollen, granular in appearance, and covered over in a portion of its extent by a thin yellowish white membrane which was firmly adherent to the underlying parts. The bulbar conjunctiva of the lower part of the globe was somewhat reddened and thickened, and presented a superficial ulcer covered by a thin membrane. Smears and cultures from the conjunctival secretion were negative, but from an excised piece cultures of streptothrix were obtained. Iodin of soda, salvarsan and locally iodine produced a slight improvement. **Sobhy** also reports a case of streptothrix infection of the conjunctiva in a young girl.

**CONJUNCTIVAL COCCIDIA.**—**Sakaguchi** finds the conjunctival coccidia to be widespread in Japan, so that the conjunctival hyperemia is frequently found among large groups of people. The coccidia have a small, round form and consist of three layers. There is a nucleus and a definite cycle of development.

**ATROPIN CONJUNCTIVITIS.**—During the employment of atropin locally, **Terson** saw develop a severe follicular conjunctivitis, covering completely the upper tarsus with granulations resembling a succulent trachoma. This subsided when euphthalmin was substituted.

**DIABETIC CONJUNCTIVITIS.**—**Hogg** reports a case of unilateral conjunctivitis in a woman 80 years of age with diabetes. It was intractable to local treatment, but yielded to diet and the administration of trypsin.

**INDUCED CONJUNCTIVITIS.**—**Cosse and Delord** describe their method for microscopic study in cases of suspected induced conjunctivitis. A pledget of cotton on a carrier is swept along the lower culdesac. The cotton is then placed on a slide with a drop of water and glycerin and examined under a cover-glass. This suffices for a gross examination. Or it may be stained with a iodine-iodid solution, which is excellent for staining the elements of powdered ipecac. For examining the powder found on the suspect, they first employ a solution of hypochlorit of soda in which the powder is placed for five minutes. After washing, it is stained with iodine for five minutes. The characteristics of powdered ipecac are found to be the same as described by Kalt (*Y. B.* v. 13, p. 108).

**Sblordone** has found that the ricinus seed is the substance preferred by the malingeringer, a small fragment being introduced into the inferior fornix. The symptoms produced are edema of the eye lids, abundant purulent secretion, swelling and thickening of the palpebral conjunctiva. At some points of the lower lid whitish eschars are seen. The bulbar conjunctiva is chemotic, forming a ring around the cornea, sprinkled with numerous reddish points. In very advanced stages the upper portion of the conjunctival sac participates. The cornea remains unaffected. The subjective symptoms are slight.

**Condorelli Francaviglia** made experiments with the bean of the castor-oil plant. He has been able to produce a conjunctivitis by the use of different parts of the bean. In his experiments

he employed the whole bean; the bean freed of its covering or skin, and collyria made from pulverized seeds. He came to the conclusion that the bean was a topical irritant to the conjunctiva, producing a mucopurulent conjunctivitis which differed from ordinary conjunctivitis of bacterial origin in its unequal distribution. The inferior palpebral conjunctiva and the corresponding portion of the culdesac are intensely inflamed, while the bulbar portion participates moderately. In several cases there was marked edema. The congestion was of a flesh color, in contradistinction to the scarlet red of genuine conjunctivitis. Palpebral edema, more or less according to the inflammatory process, was present. Induced conjunctivitis is always monocular. The paste derived from the skin-freed bean excites a more prompt and energetic reaction than does the whole bean, or the collyria. For speedy preparation it is generally more convenient to use the pith, which can be easily done by the use of a spatula knife blade, and this will exclude the possibility of acute gastroenteritis by the handling of the castor oil beans and the transference of the substance to the mouth.

**Schevensteen** described the more frequently selfinduced ocular diseases met with in the Belgian army. He refers to two types, namely; where the provocative agent is ipecacuanha powder, and where the agent cannot be exactly identified. In the former the symptoms are due to the action of the emetin. This produces two forms of conjunctivitis according to whether the powder is introduced once or repeatedly; that is, it causes either acute or a chronic conjunctivitis. He found conjunctivitis produced by such irritants as soap, tobacco, snuff, pepper and dental tartar scraped from the teeth. **Tristaino** has written a general review of the subject of provoked conjunctivitis.

**Bollack** states as an axiom that: given certain conditions under which conjunctivitis appears, a particular location and form of secretion rebellious to proper treatment, the possibility of artifacts must be entertained. A mi-

croscopic study is of utmost importance for the detection of foreign matter, absence of pathogenic organisms and the presence of polynuclear eosinophiles. The limitation of the disease to one eye is always suspicious.

**GAS INJURY TO THE CONJUNCTIVA.**—**Derby** describes the condition present in the eyes after exposure to the new German gas. First there is lacrimation and burning of the eye, coming on from three to four hours after the "gassing" occurred. This increases so that the patient is practically unable to open his eyes. In from 36 to 48 hours, or longer, the eyes can be opened and show signs of what is usually a mild burn, marked injection of the conjunctiva and usually a watery discharge, but some times a mucopurulent one. Always some ciliary injection is present and the corneal lesions vary from a roughening of the epithelium to the formation of a shallow ulcer.

**TETRYL CONJUNCTIVITIS** — **Smith** notes the occurrence of conjunctivitis, with or without dermatitis, among female workers in tetryl (tera-nitro-methyl-anilin).

**ELECTRIC OPHTHALMIA.**—**Moreau** records two cases of electric ophthalmia. The first patient, a man aged 35 years, had his eyes exposed at 6 P. M., without any protection, to the intermittent glare from electric welding for five minutes. During the following half hour he had yellow vision. But this passed off and he had no further trouble until 2 A. M. the following day, when there was swelling of the lids and redness of the conjunctiva, with considerable discharge and exfoliation of the epithelium over the lower part of the cornea. There were no pathogenic organisms. Under irrigations with artificial serum, the eyes became normal on the following day. The second patient was exposed to light from a short circuit: which immediately produced dazzling, redness and lacrimation in both eyes. There was no corneal lesion and the eyes became normal in 24 hours. The author believes fluorescein would frequently reveal corneal lesions in conjunctivitis from short circuit flames,

and in snow blindness. See also Injuries.

**VERNAL CONJUNCTIVITIS.**—**Botteri** observed seven cases in 577 patients seen between May and October. One case was unusual in that for 13 years the inflammation had been unilateral and accompanied by marked ptosis. Then the eye heretofore uninflamed showed conjunctivitis of typical vernal type. In another case the conjunctivitis was accompanied by summer catarrh and intense pigmentation of the bulbar conjunctiva. In two cases the condition accompanied an attack of mixed-infection-conjunctivitis. Three cases were of the pure bulbar type. All the patients were strong peasants and showed marked pigmentation.

**Allport** has employed X-rays in the treatment of vernal conjunctivitis in 15 cases, and in all an absolute cure was effected. Pusey, who treated the cases, considers radium as efficacious, much more convenient to use and safer. The cure is assisted in some cases by tooth brush brossage, with either boric acid powder or 1-1000 bichlorid solution. Butler's paper on the successful treatment of vernal conjunctivitis with radium was noticed last year. (Y. B. v. 13. 297.)

The treatment of spring catarrh by radium is discussed by **Butler**, who illustrates his method by the report of two cases. The exposures range from five minutes to fifteen minutes, being inversely as the quantity which was 45 milligrams to the former and 7 for the latter. They were repeated a few times daily and then at longer intervals. He quotes Mackenzie Davidson as stating: "In every case which I have treated with radium the plaques have completely disappeared, leaving no scars at all."

**Shine** treated a case of vernal conjunctivitis with radium to one eye, and astringent washes to the other. Three applications were made at two weeks interval, and a fourth, five months later. The dosage was 20 mg. of 2,000,000 activity applied from 25 to 35 minutes. One month after the last application the lid was smooth, secre-

tion much diminished and subjective symptoms greatly improved. The control eye was unchanged. He has treated four other cases with radium. Two were pronounced cured after two applications of 60 mg. for 15 minutes. One case required four applications. He has never observed complications.

**McDannald** saw a severe conjunctivitis, central keratitis and dermatitis follow a single application of radium administered for vernal conjunctivitis presumably due to faulty technic. May in discussion considered radium an effective agent for good in vernal conjunctivitis if administered in dosages of 25 mg. properly screened. **Matson** reports a case of the bulbar type in a boy 14 years of age in which the disease had its inception after an attack of measles.

**Griffith** reports a case in which after carbon-dioxid snow had failed, radium was applied with excellent results. The patient remained well for three years, then there was a slight return. After the application of radium the conjunctiva again assumed its normal appearance.

**McDannald** first saw this case nine years ago when it presented a granulomatous mass in the conjunctiva of the upper lid, the pathologic diagnosis of which was round-cell sarcoma. Nine years later both eyes presented the appearance of a mixed infection of trachoma and vernal conjunctivitis. There was dense pannus covering the upper half of each cornea. No eosinophiles were present. Despite drug and surgical treatment the condition grew worse. High frequency current was then applied once a week of one minute's duration for the first two weeks, and then once in three weeks for five months' time. The result has been almost complete recovery, the pannus having disappeared. The patient of **Bailey** had been seen the previous year by Gradle and Suker and diagnosed as plasma cellularis. Histologically the case proved to be an instance of clinically atypical vernal conjunctivitis. There was an eosiniphilia of over 5% The conjunctival secretion showed no organisms but an enormous number



eosinophiles. Failure to make this examination when the case was first seen (Y.B. v. 13, p. 107), led to the mistaken diagnosis of plasma cellularis. Lane, who made the histologic examination, stated that the origin of plasma cells in the conjunctiva was still under discussion, they having been variously attributed to the connective tissue and to the endothelial cells.

**FOLLICULAR CONJUNCTIVITIS.**—**Kearney** holds that if the routine examination of the conjunctiva of school children's lids is carried out as it is at present, by public school nurses; we shall see little or no follicular conjunctivitis nor, possibly, trachoma, if these children are sent to us when the follicles show, and are ablated then or as soon as possible afterward.

**TRACHOMA.**—**Gowens'** article deals principally with the known pathologic features of trachoma. **Edmondson** thinks there is some ground for the belief that pannus is a protective measure for the purpose of preventing granulations from denuding the cornea and producing ulceration. He adds, however, that if this is the purpose, it fails in many instances. **Broyles** discusses the differential diagnosis of trachoma. **McMullen** says there is no disputing the fact that trachoma is communicable, and that it is decidedly on the increase and is widespread.

**Mestre Medina**, who has practiced for the last two years in Utiel and Requenna in Valencia, the elevation of which district is 800 metres, has been struck with the rarity of trachoma. He concludes as follows: 1. Trachoma is rare in Utiel and Requenna. 2. It presents itself for the most part in the form of large fleshy granulations. 3. The course and prognosis of the disease are less grave than usual, it being sufficiently docile to treatment, and this fact leads him to believe that this area may be considered an antitrachomatous one. 4. Contrasted with the scarcity of granular lids, there is a relative abundance of lacrimal affections, due to repeated nasal catarrhs.

**Wakisaka** examined all the inhabitants of a fishing village that has long been known as the stamping ground

of trachoma. He found that the disease was quantitatively and qualitatively worse among women than among men, and that the family transmission was carried more by women. **Watanabe** gives the trachoma statistics in Tokushewburake, an isolated village in the province of Yamagouchi.

**Zimmer** sees in the war a cause for the dissemination of trachoma. He found in the ten months' military service the disease in 27% of his cases and during his captivity in Germany he found that 50% of the Russian prisoners were afflicted. There can be no doubt as to the contagiousness of the trouble, contracted by the common use of linens and toilet articles. In the treatment he employed 10% copper sulphate in glycerin and noted rapid improvement.

**McMullen** tells of the methods in use to eradicate trachoma from Kentucky, Virginia, West Virginia and Tennessee. The service has a total of six hospitals with a bed capacity of 120. Six physicians with special training and a complement of trained nurses and attendants are on duty at all times. Each patient is instructed in the sanitation of the disease and the hospital corps do social service work. During the year ending June 30, 1916, 3,571 homes were visited and one district nurse rode over 4,000 miles during 10 months of this period.

**McMullen** says that the eyelids of all recruits and drafted men should always be everted, the examination to include the retrotarsal fold, and the condition of the membrane should be noted in a space on the blank form reserved for this purpose. If the conjunctival surface of the eyelids is not smooth and pink, if there is any redness or secretion, especially in the retrotarsal fold, such cases should be segregated for examination by those trained in the diagnosis of trachoma. An applicant who is found to be suffering from well marked trachoma should not be immediately rejected, but should be given treatment until the trachoma is cured. He can then be reexamined to determine whether he has sufficient visual acuity.

v. Hoor has found in Austria that a considerable number of trachoma patients in and near the age of liability to military service, were skillful in escaping all attempts at supervision and treatment. This practice was overcome by the military authorities, both in the interests of the army and of general prophylaxis, by refusing to accept trachoma as excluding the patient from military service, and also by placing all trachoma patients who were liable to military service in military institutions, under the care of special physicians, until they were completely cured, after which they were sent for military service or were dismissed, according to the age at which the cure was effected. The average length of treatment was four months, and about 80% of the patients were cured within the period of liability to military service. During the service age the trachoma patients were given regular military training at the garrison hospitals. **Ferro** has written on the prevention of transmissible conjunctivitis, especially trachoma, in Argentina.

**Tenner** thinks it would be desirable to exclude the victim of trachoma from the ranks; but in so doing the army would lose many men who in a short time, three to six months, could be cured and made safe as far as contagion is concerned. These excluded persons return to their homes, continue to live under unhygienic conditions and cannot be kept under supervision. Many work in factories where they disseminate trachoma. He quotes Austria as refusing trachoma as a cause for exemption. **Wieden** reports of trachoma involving the cornea. **Gifford** calls attention to the frequency of occlusion of the inner end of the canaliculus in old trachoma. Out of fifteen cases he found only one in which the patency of the inner end of the canaliculi was not occluded. Such a canaliculus is frequently a small pus pocket and plays an important rôle in the production of the recurrent keratitis which afflicts such patients. Occasionally the canaliculus is occluded at both ends, with a dilated pus-holding cavity between. In cases with these occlusions, they are

either overlooked or they are mistaken for dacryocystitis.

**TREATMENT OF TRACHOMA.**—**Van Kirk** has met with success in the treatment of trachoma both in the immediate effects and in the after results, and in both early and late stages of the disease. After anesthetizing the eye with holocain a paddle of wood is wrapped with sterile gauze which is soaked in bichlorid of mercury 1-500; with this the entire conjunctiva is thoroughly scoured. It is then flushed with the bichlorid solution. Rubbing is repeated every few days at first and at longer intervals as the case progresses. In the first few treatments rather free reaction results.

**Friedländer** made intraglutal injection of 10 c.c. of milk in 42 cases of trachoma, all of the severer type. The results were surprisingly good. The interval between the injections was never less than 48 hours. They were never repeated before the temperature had returned to normal. In some of the cases a long previous course of office treatment had given no relief but the earning capacity was restored after a single injection. **Crawford** reports on 21 cases of trachoma treated with Bulgarian bacillus culture. Three had received no treatment for about one year and none showed any tendency to relapse. Two other cases were treated only during the winter and an examination made during the following fall. The subjective symptoms were abated and there had been no progress in the condition. The treatment was supplemented by careful expression to aid the entrance of the bacillus into the diseased tissue. He does not claim it as a specific yet he believes the results compared favorably with the record of any specific.

**Sculco** has employed a pomade made of equal parts of pulverized nepetacitriodora mixed with glucosides and resins obtained from *Thymus serpyllus* and *Salvia officinalis*. This is applied to the everted lids and after a time washed off. There is marked reaction lasting two days, but after the fifth application this does not usually occur. The interval between the treatment



varies at from four to five days; later three to four days. He reports 10 cases. The results were in all remarkably good. Accompanying photos show results. He considers it a specific. Its advantages are the safety, the rapidity of the cure, its innocuousness and its ease of application.

**Carhart** believes the choice of remedies is not so important as thorough massage either direct or through the lids. His choice is a 5 per cent copper citrat ointment. When corneal complications have developed the Heisrath-Kuhnt operation is the only radical cure. **Rebay** has reviewed the present status of vaccine therapy for trachoma.

**Kiribuchi** directs that the upper lid be everted and while it is being pressed against the supraorbital margin the patient is directed to look down. With the other hand the ball is pressed backward by a pressure made upon the lower lid. In this way the entire retrotarsal fold is exposed. With a proper instrument punctures are now made into the granulation and the infiltrated portions of the membrane. They are made down to the tarsus perpendicular to the surface. With a dossil of cotton saturated in bichlorid 1-20,000 the conjunctiva is pressed against the tarsus. After this the surface is rubbed with the sublimate solution. In this way the contents of the follicles are expressed. Following this airol is applied. Thereafter either daily or every other day friction and lavage with bichlorid or airol is employed. The advantages claimed are shortness of treatment required to secure a cure, usually one and one-half months; less trauma than by grattage or rolling, rapid cure of the secondary keratitis. **Simpson** considers light scarification, followed by either digital or instrumental expression as one of the most effective methods of treatment. **Richards** advocates grattage as the best surgical procedure.

**Suker's** indications for excision of the tarsus are: any case of trachoma which does not yield to the usual line of treatment; cases where the tarsus is intensely cicatrized and studded with vascularized pinhead nodes which

cause pannus; where the tarsus though comparatively smooth is greatly incurvated through cicatrization; when the conjunctiva is velvety and pannus is present; where the upper half of the cornea presents ulcers after an apparent disappearance of the trachoma; persistent pannus with the conjunctiva favorable for its continuance; cases in which grattage has left a distorted tarsus studded with vascular nodes. The following suggestions, if carried out, will lead to the best results:

Always leave 1 to 1½ m.m. strip of tarsus at the ciliary border. Begin the excision at the ciliary border of the lid; do not attempt to save conjunctiva directly over the tarsus; do not excise more than just the tarsus; dissect the conjunctiva far enough through the entire width of the lid into the retrotarsal fold, having just sufficient conjunctiva to cover comfortably, without too much tension, the area formerly occupied by the tarsus; do not excise the tarsus until the retrotarsal fold has been dissected; secure a good approximation of the edge of the conjunctiva to the tarsal strip left at the ciliary margin of the lid; employ a mattress suture to secure a requisite coaptation of the subconjunctival and subtarsal tissue; obliterate the "dead space" between the conjunctiva and the skin, by two properly placed sutures at a point corresponding to the previous retrotarsal border of the tarsus. This prevents retraction of the conjunctiva and prevents entropion as the anatomic insertion of the levator is thus properly maintained and ptosis does not follow it. General anesthesia is used.

**White and White** describe a method of doing canthoplasty with a special technic in cases due to trachoma. First an indelible line is drawn on the skin for the incision as a guide line. The incision is made a little above and extending from the external canthal commissure so that more of the superior fornix conjunctiva may be reached. The skin is held widely apart with the fingers and stretched toward the nose and then either with scissors or scalpel a horizontal incision is made through the skin and subtissues. The skin



edges are now undermined for some distance, especially at the conjunctival edges. For trachoma the operation proceeds as follows: First divide the canthal ligament. The skin flap is now folded on itself, that is, the skin surface is inverted and folded beneath the raw surface against the raw surface of the wound. A drawn whipped stitch is used, starting at the apex of the wound and extending to the center and then to the lower apex of the wound, passing the sutures through both folds of skin. Or a whipped running suture can be used in suturing the fold.

**Zentmayer** reports a case of trachoma in which a dense pannus in a short period of time almost entirely disappeared after the performance of the Kuhnt-Heisrath operation. In a second case of trachoma in which there was a threatened perforation of the cornea steady improvement followed this operation. The operation is considered applicable to all cases of trachoma except those in the beginning of the first stage and those at the end of the cicatricial stage.

**Dimitry**, in again urging the adoption of his method of mechanical manipulation of the tarsus in place of grating, says that he cannot accept as a logical procedure the production of scar tissue to rid the conjunctiva of the follicles. The operation performed at the Government Trachoma Hospital is, according to McMullen, done with a specially devised forceps for everting the eyelid, two small scalpels, horn-spoon for protection of the cornea, Desmarres forceps, tooth-brush of medium stiffness, bichlorid of mercury solution 1-2000 and plain sterile gauze. The eyelid is thoroughly everted and the granules superficially incised and the thickened conjunctiva carefully scarified with the scalpels, care being exercised to include the cul-de-sacs. The surfaces are then gone over with the brush and bichlorid solution, followed by the thorough use of the gauze. Immediately following the operation the everted conjunctiva is washed with boric solution. The after treatment consists of cleansing the eyes carefully every three hours and in the use of a

20 per cent solution of aristol. After five or six days any uneven granulations or rough surfaces are lightly touched with a  $\frac{1}{2}$  per cent silver nitrat solution.

**White** and **White** describe an operation which they consider applicable to palpebral cicatricial cases where deeper tissues are involved, and to the "beef-steak" cicatricial type and to the smooth congested type of cases (chronic conjunctivitis). An incision is made through the palpebral conjunctiva from canthus to canthus a few millimeters from the margin. The conjunctiva is dissected from the tarsus up to the free border where the bulbar conjunctiva begins. Next the tarsus is dissected from the underlying tissue over the same area. The tarsus is then cut into numerous vertical strips by placing one blade of a small scissors beneath the tarsus and one blade on top. With the small roller forceps the strips are crushed; and following this the conjunctiva, or both, are rolled. The conjunctiva is sutured as in the combined excision and resection operation. It is claimed that this method leads in a short time to disappearance of the cartilage.

**PLASMOMAS OF THE CORNEA.**—In each of two cases described by **Marchi** there developed in an eye affected with trachoma a small tumor; in the central region of the cornea in the first case, and in the second case in the bulbar conjunctiva contiguous to the limbus and in the cornea. Clinically these tumors of the cornea were sharply limited, projected from the corneal plane for more than two millimeters, and presented a rosy, gray color, convex and irregular surface, and a fleshy consistency. They were thus easily to be confused with sarcomata of the cornea. Their occurrence in similar cases of more or less old trachoma, however, suggests with great probability that they represent an atypical trachomatous pannus; even though as in the first case reported, the tumor arose from the central region of the cornea without any connection with the corneal limbus or with the bulbar conjunctiva.

The histologic examination in both cases showed an identical structure. The principal mass of the tumor was composed exclusively of plasma cells, with abundant newformed blood vessels with extremely thin walls. The tumor rested upon the corneal parenchyma, of which it infiltrated merely the superficial layers; and was covered on the surface by an epithelium which gave origin to numerous prolongations which entered, especially in the first case, deeply into the principal mass of the tumor. The tumors, instead of being malignant, represented a chronic inflammatory process exactly corresponding in histologic structure to trachomatous corneal pannus. **Seo** saw a child who presented a condition of the conjunctiva of the lower lid in the form of a tumor accompanied by thickening of the tarsus. Histologically the new growth which caused the thickening consisted of plasma and lymphoid cells and some follicle formation.

**PARINAUD'S CONJUNCTIVITIS.**—In **Dutrow's** case, which occurred in a married woman 28 years of age who lived on a farm, cultures gave colonies elevated and with clean-cut edges; the center being a little darker and thicker than the periphery. The organisms were short rods arranged singly or in threads and stained rather slowly with alkaline methyl blue and were Gram positive. Unstained they showed marked Brownian movement. **Fernandez Castro** reports a case apparently tuberculous in character.

**TUBERCULOSIS OF CONJUNCTIVA.**—**Weeks** reports two cases. The first was in a girl nine years of age. The disease therein involved the upper palpebral conjunctiva and fold. There were enlarged follicles which showed little or no tendency to ulcerate. The lids were expressed without relief. The second case, in a child four years of age, was identical with the first. The preauricular glands were involved. Von Pirquet was doubtful in the first and positive in the second. No systemic involvement could be discovered. The infection was presumed to be due to slight injury to the conjunctiva. Some

improvement followed tuberculin treatment. Animal inoculation tests were positive. Microscopic study of removed tissue showed giant cells and caseous masses and one acid fast bacillus was found. Glands removed from the second case showed tuberculosis degeneration. **Patterson's** patient, who presented tuberculous ulcers on the palpebral conjunctiva of the right lid, was a woman 57 years of age. She had tuberculous infiltration of both lungs. In the sections of the affected conjunctiva removed from the case reported by **Coover** as Parinaud's conjunctivitis (Y. B. v. 13, p. 103) Finnoff found the tubercle bacillus.

In the case reported by **Shannon and Hughes** the conjunctiva and cornea were both affected. The patient was a negro aged 28 years. There was a family history of tuberculosis. Six years ago he noticed a papular elevation just below the nose which was followed by others in the vicinity. The condition was diagnosed as lupus vulgaris. The glands of the neck suppurated at this time. Three years later the condition appeared on the lower lid of the left eye. Four weeks subsequently slacked lime entered the eye and a few days later there appeared a small red mass beneath the upper lid. This increased in size to the dimension of a small walnut. It was polypoid and its surface granular. It was attached to the tarsal conjunctiva. The cornea became ulcerated and perforated from extension. Histologically the growth was a tuberculoma. The von Pirquet test was positive; the Wasserman negative.

**CONJUNCTIVITIS IN BACILLARY DYSENTERY.**—**Cosse and Delord** have met with conjunctivitis as a metastatic complication in bacillary dysentery. In some cases it was accompanied by affection of the joints while in others this was absent. In the first group the dysentery was, as a rule, more severe. The conjunctivitis and the arthritis usually came on about the fifteenth day of the disease. The former lasted from eight to ten days, while the latter persisted for several weeks. Both eyes were affected at the outset. The inflammatory signs were limited to the palpebral con-

conjunctiva especially of the lower lid. Secretion was scant. Smears and cultures were negative. In one case peripheral keratitis and iritis occurred as complications of conjunctivitis. In the second group the attack was very mild and affected almost wholly the conjunctiva of the lower lid. It appeared between the fifth and twelfth days of the bowel condition. They consider it a conjunctival condition of toxic origin, rather than an inflammation.

**Morax** saw one case in an epidemic affecting 250 men in the barracks. The conjunctival disturbance occurred at the end of the second week of the disease, and on the thirty-fifth day became complicated by a relapsing iritis in the right eye. He agrees with Feissinger and Leroy, who consider the articulo-ocular syndrome as analogous to the blennorrheic syndrome.

**ATROPHYING CONJUNCTIVITIS WITH SYMBLEPHARON.**—**Kuemmell**, after noting the various causes of symblepharon, describes the condition of the conjunctiva usually met with in old people who live in the country. The conjunctiva is usually thin and smooth, particularly on the lower lid. The upper lid is uninvolved. In the later stages the conjunctiva is smooth, of a pale pink color, occasionally white, giving the appearance of a faint pseudomembrane as after a mild cauterization. On the eyeball the conjunctiva is drawn into wrinkles. The conjunctival sac shows a varying degree of shrinkage. The semilunar fold and caruncle early suffer from general atrophy, the latter is often reduced to a small yellowish red dot. A characteristic symptom is the formation of an adhesion between the lid and the globe. It is symmetric in both eyes, particularly in the region of the lower lacrimal punctum. On everting the lid a sharply defined fold of conjunctiva will be seen extending to the eyeball from the lower lid. Such adhesions may be multiple. They are much less frequent in the upper lid.

**PEMPHIGUS.**—**Weidler's** case was in a woman 71 years of age. The palpebral conjunctiva of the lower lid and the corresponding part of the bulbar conjunctiva were injected. Cicatricial

bands were gradually decreasing the depth of the cul-de-sac. No blebs or ulcers were present in the eye, but they were found in the anterior part of both nares.

**ESSENTIAL SHRINKING OF THE CONJUNCTIVA.**—**Conlon** reports two cases. The first was in a woman 50 years of age. The disease began in the mouth and when seen for the ocular condition presented large bullae all over the body. The bulbar conjunctiva presented fresh bullae. There was beginning obliteration of the lower cul-de-sac notwithstanding that the eyes had been affected but one month. The second patient, also a woman 50 years of age, was first seen two years ago and then showed numerous vertical folds of conjunctiva in the shallowed lower cul-de-sac. At present there are erosions of the cornea and iritis. Within one month there was obliteration of the lower cul-de-sac. It is possible for the patient to open the eye two or three mm. He believes all cases of essential shrinking come within the classification of those of chronic pemphigus of the conjunctiva.

The two cases reported by **Hardy** and **Lamb** both occurred in young males. One was aged 17, a student in the school for the blind who had been vaccinated when seven months old. Pemphigus appeared two months later and both eyes became affected. One was rendered entirely blind, the other retained 1/36 vision. Wasserman negative. The other patient was a colored boy, aged 11, whose vision had been reduced to light perception. His trouble began when about one year old, ascribed to mosquito bite. A Wasserman was strongly positive. These authors have reviewed the literature bringing together a bibliography of 76 papers. **Cohen** also reports a case of essential shrinking of the conjunctiva in a woman aged 61, who had been affected for twenty months. Vision in one eye was still 20/30 and in the other 3/200. There was absence of vesicles or ulcerations on the conjunctiva, or of distinct evidence of skin pemphigus. Mouth and skin lesions present had



been diagnosed differently by different dermatologists.

**SYMBLEPHARON.**—In a case of complete symblepharon following enucleation for burn by a hot metal, **Pratt** employed a procedure which to him was new. It consisted in making a double row of holes in a large tin plate prosthesis and the suturing of a Thiersch graft to the plate. The sutures were removed after the sixth day. The graft lived but contracted to one-third of its original size. He proposes next to use the foreskin of a young child in place of the Thiersch graft. **Zentmayer** operated successfully by the **Berens'** method in a case of symblepharon where there was a rather broad adhesion between the lid and cornea at the position of an adherent leucoma.

**XEROSIS.**—**Stilwill** saw xerosis of the cornea and bulbar conjunctiva of one eye in a case of bilateral cicatricial trachoma.

**SUBCONJUNCTIVAL CYST.**—**Stirling** saw this unusual condition in a man 76 years of age. There was an oval semi-opaque swelling starting 2 mm. from the outer edge of the cornea opposite the palpebral fissure and extending out-

ward 5 mm., the vertical diameter being 3 mm. It was resilient with slight fluctuation and was fixed to the sclera. The conjunctiva was adherent to the apex but sloped away at its base. The cyst was perforated during its dissection, evacuating a clear fluid together with 7 small opaque bead-shaped bodies varying in size from a small pinhead to a split pea. The cyst was dissected out. The microscopic report by **Oertel** showed the cyst walls to consist almost entirely of well-formed large and medium-sized squamous epithelial cells with a good number of epithelial pearls. The cells rested in close proximity, forming thick layers, giving it an appearance of epidermis. He considers it to be of epidermal origin and that it owes its development to the proliferation of the lining squamous epithelium, central softening and cystic degeneration; with secondary papillary epithelial projection into the lumen of the mother cyst, thus giving rise to daughter cysts. Although there was no history of injury, **Stirling** believes it to have had its origin from implantation of a foreign body, though none was found.

## CORNEA AND SCLERA.

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ST. LOUIS.

This section reviews the literature on diseases of the cornea and sclera for the year 1917.

### CORNEA.

**ANATOMY.**—Vital staining of the cornea was accomplished by **Suganuma** and **Hoshiyama** by intracorneal injections of lithium-carmin. Either preceding or following the staining, the cornea was cauterized with a zinc solution, the ciliary arteries were severed or Croton oil injected into the vitreous. The following spiculae were formed:

(a) Spiculae with eosinophilic granules (consisting of eosinophilic leucocytes that had forced their way in between the fibrillae).

(b) Spiculae with coarse carminophilic granules (consisting of Ranvier's plasmotocytes that had forced their way in between the fibrillae).

(c) Spiculae with delicate carminophilic granules (consisting of corneal bodies that had become mobile and forced their way in between the fibrillae).

Regeneration spiculae, with delicate carminophilic granules (consisting mostly of corneal bodies which usually were in direct protoplasmic connection with the undamaged mother cell).

The authors did not mention any-

thing decisive regarding the question whether or not there be so-called slumber cells within the cornea, which awake during an inflammatory process and take part in the formation of the spiculae, but they declined to doubt the truth of this theory.

**GROOVE KERATITIS.**—**Kuriyama** reports anatomic-pathologic findings in a case of chronic peripheral groove keratitis. There was observed in a 41-year old patient who died of acute gangrene of the skin, a progressive peripheral ulcer of the cornea in both eyes. Anatomically the floor was covered by a layer of epithelium, while the underlying parenchyma was composed of round, mast, and plasma cells. A great deal of fat was manifest by Sudan III stain.

**EPITHELIAL DYSTROPHY.**—An unusual form of epithelial dystrophy has been reported by **Posey** occurring in a young married woman, following an attack of ordinary conjunctivitis. There first appeared a faint stippling of the corneal epithelium followed by a dense white opacity, arch like in form and superficially vascular. This haze traveled slowly across the cornea. Posey explained the condition as one of corneal dystrophy, the most marked changes being located in the epithelium, the dense white area representing the hyalin product of the epithelial and subepithelial elements. The case seems to be similar to two cases by Bordley (see Y. B., V. 13, p. 119), which started at the corneal margin and gradually encroached toward the center of the cornea and then receded. No treatment seemed to have any effect.

**Weeks** reported an unusual case of epithelial proliferation of the cornea, elevated, circumscribed, elliptically shaped, 4 mm. by 8 mm., which had been twice removed and recurred. There was no inflammatory reaction, no injection of the cornea, and no bacteria were found in the scrapings, which consisted entirely of epithelial cells. The growth was of six months duration and perhaps analogous to the epithelial plaques.

**NEUROPATHIC KERATITIS.**—A case of calcareous deposits in the cornea is de-

scribed by **Gradle** in a man who had had repeated attacks of corneal ulceration during the past seven years, evidently of neuropathic origin. Both Wassermann and tuberculin reactions were negative. It had been suggested that in hyperparathyroidism, there being a deficiency of calcium in the circulating plasma, the patient be fed large quantities of parathyroid extract, trying to produce a deficiency of calcium, leading to absorption of calcium in the cornea.

Under the name of *Alphabet keratitis*, **Haab** describes a disease which seems to be analogous to the superficial linear keratitis described with much detail by Spicer and Greeves (Y. B., v. 12, p. 125). He lays emphasis on the importance of use of oblique illumination and the loupe, and recommends especially the Nernst lamp and Gullstrand apparatus. In the last eighteen years, Haab has seen only seven cases of this rare affection, which on good oblique illumination shows raised lines in the surface of the cornea, which cross and recross, giving the appearance of letters. The lines are straight and of different lengths. Haab treated one case successfully with Koch's old tuberculin but it is impossible to judge from one instance that the disease has a tuberculous basis.

An unusually severe case of *herpes zoster ophthalmicus* was described by **Chance**, with dense opacity in the interstitial laminae of the cornea as made out with the loupe under oblique illumination.

Under the title of *dumbbell keratitis* an interesting series of three cases of corneal affection is reported by **Buxton**, which undoubtedly are closely related to the dendritic form of keratitis. The ulcer first made its appearance 2 mm. from the upper corneal margin. It was grayish white in appearance, with a comet like tail extending vertically downward, becoming markedly constricted as it left the head. The tail gradually extended downward until it reached a corresponding point near the lower corneal margin, when it expanded into another ulcer similar to the one above, giving the whole the

appearance of a dumbbell. There was little or no pain connected with the process and only slight pericorneal redness. The ulcer slowly disappeared without any physical cause having been found to account for it.

**BULLOUS KERATITIS.**—A case has been reported by **Campos**, four days after a burn of the second degree involving the thigh and foot, caused by an asphyxiating bomb. There were central opacities in both eyes, with more or less opacity in the periphery. In addition, there was a bulla in the center of the left cornea, formed of three pockets, which could be made to fuse into one by stroking with the upper lid. The tension was minus. Healing occurred rapidly while using an ointment of boric acid in lanolin. The patient never had any pain in his eyes, which Campos seemed to think showed that the pain in keratitis bullosa is not due to a stretching of the nerve filaments by displacement of the epithelium.

**CORNEAL ULCERS WITH ACUTE INFECTIONS.**—**Paul** describes the microscopic differences appearing in the cornea of the rabbit inoculated with the contents of a pustule of *vaccinia*, *varicella* and *variola*, after fixation in sublimat. He considers the reaction of great importance in police sanitation. Every time it occurs it is variola. It is not yet determined when it is positive, whether it is more or less virulent. **Perez Buñill** reports a case of destructive ulcer following smallpox.

**Wyler** saw a five year old girl affected with a mild case of *varicella* whose only symptoms were swollen closed lids, marginal crusts and extreme photophobia. In the center of the cornea was a punched out area 2 mm. in diameter, edges sharply marked, center deep and grayish. The ulcer showed no tendency to spread; within two weeks it was covered with epithelium. Six months later the vision was 6/36, whereas it had been normal before. Ten months later it was 6/24. The case corresponds to one described by Terson in a girl of eighteen.

Three cases of ocular *herpes* following *antityphoid vaccination* were reported by **Gloagen**, accompanied by fever, headache, and dorso-lumbar pain. Also cutaneous herpes. The corneal herpes was observed after the first injection in one case; after two injections in the second; and after the fourth injection in the third case. In each case remaining corneal opacities reduced the vision to 0., 0.2 and 0.6 respectively. A similar case in a soldier, aged 43 years, was reported by **Morax**, following the third injection; herpes of the lower lid appearing after the second.

**Woods** found, in experimenting on *trypanosome keratitis* in dogs that the keratitis bears a striking resemblance to that caused in man by the *treponema pallida*. The development of the symptoms appears in both with the appearance of trypanosomes and spirochetes. The lesions are readily cured by repeated injections of arsenobenzol. The experiments are corroborative of those made by other workers.

**MOOREN'S ULCER.**—Additions to the pathologic anatomy of rodent ulcer of the cornea are described by **Masuda**. In this unusual type of ulcer, the author found the following: The base of the ulcer was covered with a 7-10 cell deep layer of epithelium that at the edges curved over so that the floor of the ulcer was denuded of epithelium. There was some lymphocytic and plasma cell infiltration under the thickened epithelium of the floor as well as some polynuclear leucocytes and eosinophiles. The central abrupt edge, where Bowman's membrane and the epithelial layer were lacking, was likewise infiltrated, but especially at the apex of the curve where the peripheral portions joined the floor of the ulcer, was a dense cellular infiltration that could be followed deep into the corneal parenchyma. The rest of normal appearing cornea showed but slight cellular infiltration, and Descemet's membrane and the endothelium were intact. The author does not believe that this is an ectogenous process, but rather that it is due to endogenous bacillary toxemia, causing the corneal destruction. In proof of this, he mentions the fact



that both eyes are frequently attacked and that therapeutic measures aimed at local relief are without avail. **Shannon** demonstrated a case cured after five cauterizations.

**PREVENTION OF CORNEAL INFECTIONS.**—A careful and systematically arranged article on the prevention of corneal infections is presented by **Oström**, who arrives at the following conclusions:

(1) Every injury of the cornea can be kept from becoming infected, and, if infected, the wound can be rendered sterile without material injury to the tissue beyond the original trauma, if seen soon after the injury. The treatment to depend on the bacterial findings, viz.: (a) *Morax-Axenfeld diplobacillus*—Zinc fluorescein, or zinc salts. (b) *Pneumococcus*—Optochin. (c) *Streptococcus* and *Staphylococcus*—Iodin or formalin (Chaufrage). (d) *Gonococcus*—Argyrol or silver nitrat. (e) *Diphtheria bacillus*—Antitoxin.

(2) The eye will do just as well with, as without, a bandage after the removal of the foreign body, whether infected or sterile. The final result will depend on the treatment as outlined in 1.

(3) Spuds can be sterilized equally well, if properly done with phenol and alcohol, or by boiling long enough.

(4) Just as good results are obtained if the patient returns to work after the removal of the foreign body, as if he waits till the next day, if primary treatment is correct. The eye to be kept closed until the cocain anesthesia wears off, and the tears begin to flow.

(5) The ordinary first-aid man is to be condemned as dangerous in removing foreign bodies from the cornea. By careful training some can be made efficient, but most of them cannot.

The use of atropin, subconjunctival injections, application of heat and cold, and other self evident measures of symptomatic treatment is taken for granted in each case. This paper deals with the prevention of infection of the cornea—not the treatment or care of after results.

**DIPLOBACILLUS ULCER.**—**Scarlett** reports on 20 cases of corneal ulcer in which bacteriologic examination re-

vealed a diplobacillus. In 6 of these it was found to be the diplobacillus of *Morax* and *Axenfeld*, and in 13 the bacillus of *Petit*. In one case the organism was what he calls *bacillus duplex nonliquefaciens*. The latter organism he thinks distinct from the others, because it will grow in gelatin without liquefaction, causes no erosion or liquefaction on coagulated serum, and when inoculated into rabbits will produce a serum containing specific agglutins and precipitins. He notes that marginal ulcers contained only the *M.-A. bacillus*, which was also found in the conjunctiva. These were never accompanied by hypopyon and healed quickly. Central ulcers contained the bacillus of *Petit*, or the new form; and were accompanied by hypopyon in all but three cases. They were much more difficult to heal and in every case left a corneal scar that interfered with vision.

**CORNEAL ULCERATION IN FISH.**—**Henschen** observed that a large number of sharks and crayfish living in the fish tank which was placed in the sea, were attacked by an eye disease which began with a very superficial desquamation of the corneal epithelium, always appearing at the highest convexity of the cornea, and extending toward the periphery. The keratitis extended deeper until finally perforation occurred with prolapse of the iris and some times evisceration of the contents of the globe. He found the cause to be traumatic lesions due to their companions, especially the crayfish with their long spikes; and they were affected to a much less extent than the sharks.

**TREATMENT OF CORNEAL ULCERS.**—**McHenry** gives a good review of the literature of the treatment of keratitis, his personal views including the avoidance of the use of cocain for the relief of pain in corneal ulcers, and substituting heat or opiates and dionin. He finds optochin useless in any but cases of *pneumococcus* infections, altho numerous authors have reported to the contrary. (*Darier*, Y. B., v. 13, p. 36.) **Dabney** also reviews the standard methods of treating corneal ulcers.

Keratotomy is advocated by **Foroni**, who reports the results of operation on two hundred cases in the last four years. (Y. B., v. 12, p. 115.) The infiltrated parts are outlined with the Graefe knife. The knife is then introduced at right angles to the surface of the cornea at as short a distance from the diseased parts as possible. The depth of the incision depends on the thickness of the cornea. It is self-evident that only the superficial areas can be divided. The inner margin is then grasped with the forceps, or with the hook, and the entire cornea within the incision is carefully dissected off. Care must be taken not to penetrate the anterior chamber or to expose Desmet's membrane. The peripheric portions of the corneal defect may show small yellowish infiltrative areas. These must be carefully removed. With the curet or with Desmarres' scarificator the entire cornea is scraped, the wound being continuously irrigated. The margins are then smoothed over with a pair of scissors. Then irrigate with 1-1000 bichlorid or cyanid of mercury. Then the entire conjunctival sac is irrigated with 1-5000 solution. Atropin is instilled and sterile xeroform applied. Healing takes place in from a few days to a few weeks. Severe pain and inflammatory symptoms disappear in twenty-four hours. The advantage is the slight opacity which remains. If there is a large central scar remaining, and very dense he dissects down a broad conjunctival flap, which exposes the sclero-corneal region, then introduces the point of the Graefe knife into the anterior chamber and performs iridectomy.

**Williams** believes that *pasteurization* is not used often enough and reports six cases brought to a successful termination with this method, the pain being brought under immediate control, as well as the tendency to spread. The method of Shahan has been described elsewhere (p. 8). **Burns** reported a case of marginal serpent ulcer in which he used the pasteurization treatment with happy result. He believes it was a pneumococcic ulcer although he did not take a culture.

**Young** has reported on the value of superheated air and other methods of treatment.

The use of collosol argentinum is mentioned by **Boys**, who includes in a report of several successful cases, that of a girl of eighteen suffering from an ulcer which healed in an astonishingly short time after the instillation of two drops of the remedy.

An ocular therapeutic lamp is recommended by **George** and **Toren** (see p. 8), for the treatment of corneal ulcers, episcleritis and ciliary neuralgia. The lamp consists of a parabolic reflector containing a 50 watt electric light with a violet glass globe. It must be accurately adjusted so that the cornea will be a distance of 60 mm. from the front of the bulb, which is the focal distance of the reflector and will give a temperature of 170° F. in 15 minutes which was found to be the most effective temperature for treatment of these conditions. Experiments with cultures of virulent strains of staphylococcus aureus and albus, and streptococcus pyogenes show that the growth of the former is inhibited after thirteen minutes and they are killed in 15 minutes, while the streptococci are inhibited after 12 minutes' exposure and killed after 13 minutes. They believe that the violet color of the rays, as well as the heat is a factor in obtaining beneficial results.

After reviewing the various current methods of treating hypopyon keratitis **Verhoeff** describes the one which he has adopted. The patient, lying down and looking toward the ceiling, must keep this position throughout the treatment. The eye is thoroughly cocaineized, and a speculum inserted. The point of a Beer's knife is entered obliquely in the margin of the ulcer, and pushed thru to the opposite margin, going as deeply as possible without entering the anterior chamber. The back of the knife pushed toward the membrane of Desmet tends to displace it without its being perforated. Then the point of the knife is entered near the middle of the first incision and two radial cuts made, forming a crucial incision. The infiltrated border of the ulcer is curetted superficially with



the point of the knife. Next a solution of

Iodin .....	25
Potassium iodid .....	50
Water .....	100

is applied by a cotton tipped toothpick. The cornea being dried so that the solution will not spread to injure the neighboring epithelium. When the surface of the ulcer has been moistened, enough solution is added at the center to make a puddle. This is allowed to remain five minutes and quickly washed away by a jet of boric acid solution. In large, rapidly progressive ulcers, at the close of this treatment a puncture is made with the Beer's knife to drain away the aqueous, but not large enough to allow the escape of the hypopyon. In 42 cases, 21 small ulcers 4 mm. or less, and 8 of moderate size, had the process checked in every case. Of 13 large ulcers 8 were checked and 5 were not checked.

**CORNEAL REPAIR UNDER CONJUNCTIVAL FLAP.**—An interesting case of corneal repair has been related by **Ourga** in which, as the result of a shell explosion, the lower fourth of the cornea was destroyed, the gap being occupied by iris. There was a traumatic cataract. The day following the injury the conjunctiva was separated from its attachment to the cornea, the jagged edges of the corneal wound were cauterized, the conjunctiva was drawn over the cornea and its edges united by a transverse suture. Seven days later the stitches were removed and the upper portion of the conjunctiva began to retract and was in its normal position within two weeks. The lower part was firmly adherent to the margins of the wound forming a large opaque patch over the lower half of the cornea. There was slight bulging of this area, which gradually diminished and within four months disappeared entirely, while the loss of corneal tissue seemed to be replaced entirely, with intraocular tension normal. **Zentmayer** thinks this method of treatment deserves more attention. He reports a case of fistula following injury thus cured.

**KERATOMALACIA.**—Under the title of "eye diseases from deficiency of fat in food," **Bloch** reports the study of forty cases observed by him in the last five years at Copenhagen. In five cases there was xerosis alone; in twenty-seven, bilateral keratomalacia, and in seven others only in one eye. There was ulcer of the cornea in nearly every case. The age of the patients varied from a few months to a little over one year. Some died from their atrophy, some from extension of gangrene from the ulcerating cornea; others recovered. The hemoglobin was as low as 30 per cent in some and never over 80 per cent. A peculiar susceptibility to infectious processes was evident in the common rhinitis, otitic furuncles, gangrene or pus. Diarrhea was frequent. By the exclusion of syphilis, myxedema and other constitutional diseases, **Bloch** traced this entire set of symptoms to the food children had been getting, chiefly lack of fat. The majority of **Bloch's** cases date from the years the war has been in progress. Thirty-eight were from the rural districts and only 21 from the city; all the rural babies having been fed on centrifugalized milk. Treatment consisted in administering breast milk or cod liver oil. He sounds a warning that often serious eye trouble is masked by conjunctivitis, and that possibly many instances of blindness and leukoma in adults are due to unrecognized xerosis in infancy. The whole trouble can easily be cured by feeding with breast milk and cod liver oil, or cod liver oil and whole sweet milk.

**PARENCHYMATOUS KERATITIS.**—The enucleated eye of a case of parenchymatous keratitis was carefully examined by **Suganuma** with the following result:

General atrophy of the epithelial layer; near the limbus a subepithelial inclusion of a pannus tissue, in the parenchyma a dilatation of the lymph spaces, increase and necrosis of the corneal bodies—increase of the wandering cells, infiltration by white blood cells, coagulation and necrosis of the corneal lamellae. Descemet's membrane is well preserved, altho the en-



dothelial cells are lacking in the central area. At the root of the iris and in the ciliary projections are accumulations of cell infiltrates, the vessels of this region are partially obliterated. In the superficial layers of the sclera is a cellular infiltration, and the marginal vessels of the cornea show an increase in the endothelial cells and collections of white blood cells. The author believes that the disease can be traced to the syphilotoxic influence; which first develops its effect on the corneal bodies within the corneal parenchyma, followed by an increase and eventual necrosis of these cells. Good results from the use of salvarsan and mercury have been obtained by **Spencer** and **Almkvist**.

**Suker** believes there must be two types of this disease; one, in which the cornea shows small infiltrative spots with radiations emanating from these areas, and the other in which the principal feature is corneal striations. The first he believes to be a direct expression of the activity of the spirochete in the cornea, the process being not so deep, and more responsive to treatment. The second type he thinks must be due to a syphilitic toxin, lies much deeper, and consequently is not so amenable to antiluetic treatment but does respond some to tonic treatment.

**Stephenson** calls attention to a form of parenchymatous keratitis in which the ordinary salmon patch is replaced by a somewhat prominent fleshy looking mass, at first sight resembling nothing so much as a neoplasm. Other parts of the cornea present the ordinary appearances of this form of keratitis. Gradually the fleshy looking mass loses its prominence and sinks to the general corneal level. It is not followed by local bulging. In other respects such cases run the ordinary course of parenchymatous keratitis.

**Derby** reports upon the end results of parenchymatous keratitis, in a series of 96 cases, in two of which but one eye was affected. In 168 eyes more or less corneal opacity remained, in 14 none could be seen. In 171 eyes vessels were found in the cornea. In 15 they were absent. Posterior synechiae were

noted in 62 eyes. In 4 eyes there was slight opacification of the lens. In 11 vitreous opacities were noted. But in 38 eyes the corneal scars, or a permanently contracted pupil, made it impossible to examine the deeper structures. Of 148 eyes examined for changes in the choroid and retina 81 showed lesions, mostly rounded disseminated spots, situated in the equatorial region. The vision present was ascertained in 161 eyes to be as follows:

Number of eyes	Vision
32 .....	10/10
17 .....	7/10
18 .....	5/10
13 .....	4/10
25 .....	3/10
14 .....	2/10
17 .....	1/10
25 .....	less than 1/10

In some cases vision may improve as the child grows older, but in others it may be farther damaged by recurrences. These, **Derby** believes, are more frequent than existing statistics indicate. In 37 cases carefully investigated with reference to this point he found positive evidence of recurrences in 14, and probable in 3 others.

#### TUBERCULOSIS OF THE CORNEA.—

**Goldbach** claims that in the majority of cases of lymphatic nodular keratitis, if we use all methods of diagnosis, we will find some evidence of symptoms that go with tuberculosis. The eye manifestations will at least make one think of tuberculosis and will aid us in checking a tuberculosis tendency. Of 39 cases reported 7 had pulmonary phthisis; 16 had some form of tuberculosis as cervical adenitis or tuberculous bone; 32 had a von Pirquet, 18 had adenoids and diseased tonsils (the tubercle was found 6 times in microscopic sections); 4 showed tubercle bacilli in the sputum; 8 physical examinations were suggestive of some form of lung involvement, 13 had Wassermann tests with 11 negative. Seven had one member of their family with tuberculosis. A clinical case reported by **Vidal Fraxanet** presented an isolated lesion deep in the cornea, ending in recovery.

In the discussion following the presentation of a case of tuberculous keratitis by **Garraghan**, **Suker** and **Dodd** laid particular stress on the necessity of small doses in diagnostic tuberculin tests, as well as caution against increasing the dose too rapidly, keeping the dose down to a point where there would be no marked focal reaction, coinciding with the views of **Woods**. **Cross** reported an interesting case of tuberculous keratitis where the vision was improved in 9 months from 5/60 to 6/9 from injections of tuberculin, preceded by small doses of **Mehnarto's** contratoxin.

**ARCUS JUVENILIS**.—**Kusama** reports three cases of juvenile arcus, and especially the microscopic and chemic findings with regard to two small pieces of tissue removed for examination. He found, contrary to what is the case in arcus senilis, that the epithelial layer, Bowman's membrane, and the parenchyma of the cornea, were all decidedly abnormal. There were vacuoles or fat globules in the epithelial cells. Interruptions and thickenings of Bowman's membrane, and fibrous changes in the parenchyma of the cornea, such as are never found in arcus senilis. The fatty substance in the cornea yields a glycerine ester, and the condition must be regarded as a kind of fatty degeneration of the cornea. No oxydase reaction was shown. **Basterra y Santa Cruz** reports a case occurring in a patient aged 30 years who gave no history of any family predisposition.

**PRIMARY PROGRESSIVE DEGENERATION**.—**Axenfeld** places the corneal progressive degenerations of the cornea in four groups. (1) Chronic degeneration of the hyalin type nodular, **Groenouw**; lattice like, **Haab**, **Dimmer**; familial, **Fleischer**. (2) Progressive degeneration from deposit of uric acid salts. (**Uhthoff**). (3) Progressive fatty degeneration (**Tertsch**). (4) Progressive interstitial calcareous deposits. Of the fourth group he reports a case in detail, where the opacity first made its appearance as a bright spot in the right eye in the sixth year, until a complete ring was formed at the present time at the age of 35.

The entire cornea was involved except that corresponding to the pupil. Even this, examined with a lens, showed lattice formation. Vision was 6/12 with the right; 6/8 with the left. Microscopic examination of two small excised pieces showed numerous highly refractile particles without definite shape, soluble in sulfurous acid, from which calcareous crystals could be obtained. The epithelium was undisturbed and there was no evidence of an inflammatory process. The deposits seemed chiefly to lie in the corneal parenchyma.

**Axenfeld** under the name of *calcareous dystrophy* of the cornea describes a condition of progressively developing opacity in which the lesions are seated beneath Bowman's membrane in the corneal parenchyma. They consist of destruction of the corneal tissue which is replaced by a calcareous nodule, which is not affected by the ammonium tartrat.

**CORNEAL OPACITIES**.—**Santos Fernandez** reported 2 cases of spontaneous clearing of the cornea in children, one from ophthalmia neonatorum and the other of unknown origin.

**Hagen** reported a case of corneo-scleral bleb which appeared three years after rupture of the globe from an axe. The protrusion occurred at the site of the rupture at the lower corneal margin, measuring 8 mm. by 10 mm. and encroaching 3 mm. on the cornea. Both walls and contents of the bleb were relatively transparent. Puncture of the cyst failed to produce any improvement in the eye, which was enucleated.

**Posey** reported an unusual progressive superficial opacity in the left cornea, at first free from vessels, and which responded to treatment but grew worse when neglected. The involved area was anesthetic. **Posey** explains the conditions as due to trophic change in the epithelium, in consequence of preceding inflammation of the conjunctiva. The case is similar to two cases reported by **Bordley** (*Y. B.*, v. 13, p. 119), due to trauma thru the closed lids.

**CORNEAL TATTOOING**.—On account of the dangers and unsatisfactory results

of corneal tattooing by the usual method, **Verhoeff** has injected India ink into the corneal tissue thru a hypodermic syringe. The ink emulsion was thoroly rubbed up and placed in a glass syringe with a medium sized needle. The needle is stuck into a cork and the whole placed in the sterilizer and boiled. Great care is taken that the needle shall not enter the anterior chamber, and the injection is checked while a narrow rim of the scar remains unblackened. For a large scar it may be necessary to introduce the needle at two or three points. The injection is followed by slight reaction which subsides in a week.

**Allport**, instead of tattooing the cornea with needles, scrapes off the corneal epithelium with a cataract knife, rubs the India ink emulsion into the raw surface with a cotton swab several times, and keeps the eye open for about ten minutes to allow it to stain the tissues. Sometimes the operation has required repetition to produce a sufficient discoloration. **Wyler** calls attention to the method of **Froehlich**, which he has modified and used with satisfaction. A very superficial flap is cut in the center of the cornea with a trephine and dissected up except at one margin where it is left hanging by a hinge of tissue. The India or Chinese ink emulsion worked up in mercuric chlorid solution is applied to the raw surface and the flap turned back in place. This gives a black, round imitation of the pupil, which has been permanent for as much as six years.

#### TREATMENT OF CORNEAL OPACITIES.—

**Jickeli** has tried a mixture of 10 per cent ammonium chlorid, with  $1/5$  per cent tartaric acid without success, in experimenting in an endeavor to clear up corneal opacities due to lime. Neither was neutral ammonium tartrate helpful.

An exhaustive review of the present status of corneal transplantation, with some experimental data and report of three cases operated upon by the method developed, is given by **Walker**. His laboratory experiments consisted of operations on twelve dogs, the first three of which were unsuccessful, due

to puncturing the anterior chamber. The later ones were more or less successful. He uses an autoplasmic corneal graft with a conjunctival flap attached, the graft being somewhat thinner than the portion of cornea removed; technic for removal of both being on the principle of making a Thiersch graft, after first transfixing the cornea with a Graefe knife. We believe that if he were to split the cornea in making his grafts as well as in removing the opaque portion; he would not alone find the technic made easier, but that there would be less opacity resulting than where the flap is of varying thickness. **Leoz Ortin** reports a continuation of his studies in experimental keratoplasty.

To relieve a case of corneal staphyloma with complete obliteration of the anterior chamber, **Darling** first performed Heine's cyclodialysis operation opposite the widest area of sound corneal rim. The spatula, when in the anterior chamber separated the iris from the cornea; it was passed forward until the iris was somewhat torn from the corneal rim, (the spatula being well curved so that it hugged the back of the cornea). With the point of a keratome, using sawing movements, the spatula was cut down upon well back in the limbus so that the cornea would be left untouched and the iridectomy would be well to the root of the iris to give good drainage.

This incision was enlarged with scissors but a canaliculus knife, if very sharp, would have been better. The iris forceps were now introduced, the spatula removed, and an iridectomy of about 3 mm. wide was made at the first attempt. To make the iridectomy wider the spatula was reintroduced to get the iris forceps between the iris and cornea; this was done on one side and then the other of the primary attempt, giving an iridectomy of over 10 mm. wide well back at the root of the iris.

**CORNEAL STAINING.**—Cases of discoloration of the cornea following trauma and intraocular hemorrhage are reported by **Watanabe**. He believes the discoloration is generally due to the presence of hemosiderin in the cornea.



A pure green color appears only in the presence of cyclitis.

**CONICAL CORNEA.**—**Jackson** reports notes made on forty-eight cases of this disease and believes that while eye strain has its influence here as in posterior myopia, the general physical condition plays the most important part. He has found a generally depressed nutrition in almost every case he investigated. The points to which he especially directs attention are:

1. Keratoconus arises from yielding of the cornea to intraocular pressure during a period of impaired nutrition, commonly due to general disease.

2. It gives rise to curvature ametropia, about which the ophthalmometer and the shadow test give little information of value for the selection of glasses.

3. The subjective tests with lenses give widely variable results; and a decision as to the best lens is reached only after many trials, under varied conditions influencing the pupil.

4. It is extremely important that glasses should give the best vision under the conditions under which they will be used; without lid pressure, which is to be carefully avoided.

5. The treatment should include: Every effort to build up and sustain nutrition. The continuous use of a miotic in the worst cases, usually pilocarpin. The avoidance of softening of the cornea by any form of bandages. Under proper care operative treatment will rarely be needed. **Amoretti** discusses the relation of keratoconus to the internal secretions.

**Wiener** describes a new operative method for the relief of conical cornea. He excises an elliptical segment of cornea about 12 mm. long and 4 mm. wide, usually from the upper half. The excised portion embraces only about two thirds the thickness of the corneal tissue. The edges are then approximated by means of a previously described suture, tied over thin gold strips in the manner of closing a cleft palate. Just before the sutures are tied the anterior chamber is purposely punctured in order to more easily bring the edges together with less tension.

The sutures are permitted to remain about 10 days. While the technic of the operation is difficult, the results are at least as good as any thus far described with the advantage of involving less risk to the patient and very little scar. **Maggiore** reviews the methods of treatment for keratoconus.

**MARGINAL ECTASIA.**—**Marques** reports the case of a man of 46 who complained of impaired vision in the right eye. A white line, like the arcus senilis, ran along the outer margin of the cornea. It bifurcated, to form the crescent enclosing the area of ectasia, which comprised the inner two-thirds of the semicircumference of the cornea. The first sign of the anomaly was noticed at the age of ten. A similar case was reported by **Terrien**. **Ziba** also reports ectasia of the cornea in a man 24 years old, who had a nearly healed trachoma of the cicatricial type. The ectasia of the upper portion of the cornea contained blood vessels. This was not gerontoxon. Histologically it was found that Bowman's membrane was wanting, being replaced by a thin cicatricial membrane. There were no inflammatory changes in the parenchyma, but fatty degeneration was observed. The author ascribes the condition to cicatricial pannus following fatty degeneration, which later went into ectasia.

## SCLERA.

**BLUE SCLERAS AND FRAGILITAS OSIIUM.**—**Bronson** gives a history of disease in two families, one of 55 individuals in 4 generations, of which 21 had gray-blue sclerotics. Of these, only one, a boy of six has had no fractures. Sprains and dislocations are also common. The heads show an abnormal prominence of the frontal and occipital bones; in two, patency throughout life, of fontanelles. Of 8 adults with blue sclerotics, 7 had varying degrees of deafness. One died at 23 not affected.

In the second family, consisting of 8 individuals in 3 generations, 7 have blue sclerotics. Of these, 4 have had fractures, 2 others a tendency to sprains. All are able to lead a natural

life, except one child who is too susceptible to fractures. In this family the head has the characteristic shape frequently seen in osteogenesis imperfecta congenita; namely, increase in the bitemporal diameter, so that the ears turn downward and outward, and slight tilting downward of the axes of the eyes and an underhung lower jaw. There is no tendency to deafness or to arteriosclerosis. In both families the stature is below the average, with the exception of three members of the first family.

Another series is reported by **van der Hoeve**, who gives the family tree thru four generations of a family, in which eleven out of twenty-two members had blue sclerotics, extremely fragile bones and otosclerosis. Fracture and curvature of bones were common and nearly all the members of the family were delicately built. Seven of the nine personally examined had syndactylia.

The grandfather and four of his six children presented the trio of anomalies, and six of the seven of one of the sons affected, but all of the seven other grandchildren escaped.

**Goldbloom** reports the case of a man who at 33 suffered his forty-ninth fracture. Thirty of these had occurred by the time he was fifteen years old, the first being at fifteen months. He had "china-blue" scleras, but his family history was negative.

**EPISCLERITIS.**—**Simon de Guilleuma** advocates ionotherapy in episcleritis and describes in detail his apparatus for applying the same. The principal points are that the eye bath must be of glass, has an opening in one side to admit of the attachment of a rubber filling ball, has an electrode of carbon connected to a terminal on the other side, and, on top (the patient in the recumbent position), an air hole. The author insists on doing away with metals in the construction of the bath, and the necessity of transparency, so that the surgeon can see that the eye is open; on the perfect fit of the edges to the orbit, and on the cleanliness of the apparatus and the ease of refilling, should any liquid be accidentally spilt.

**SCLERITIS.**—**Delmire de Caralt** dis-

cusses the morphology and pathogenesis of scleritis. He considers that the classification of de Wecker has retarded for a quarter of a century the knowledge of affections of the sclerotic, which are usually merely the secondary expression of disturbances of the uveal tract. In the author's own statistics the papular and papulo-ampullary forms owed their origin in ten cases to oligoarticular pseudorheumatism, seven cases to gonorrheal infection, fifteen cases to genital infections, two cases to malaria, five cases to smallpox or pneumonia, two cases to subacute posttyphoid enteritis, three cases to chronic enteritis, one case to an infection of the biliary passages, three cases to maxillary sinuitis, one case to mastoiditis, four cases to dental alveolitis, one case to parotiditis, and some others to tonsillitis. Of the subacute type, sixty-three were of the nodular form and only three gummatous.

In secondary scleritis connected with chronic uveal inflammations, **Fuchs** finds the tissue infiltrated with the lymphocytes and plasma cells; polynuclear cells being rare. The openings to the canal of Schlemm and the anterior vessels are always infiltrated. Those of the vortex veins and posterior ciliary arteries less so. In the episcleral tissue the infiltration continues along the vessels into the capsule of Tenon, and about the insertions of the tendons.

**REPAIR OF SCLERA.**—The histologic studies of this subject made by **Bonnefon** and **Fromaget** include the examination of aseptic experimental resections and of human eyes that have undergone sclerectomy. They conclude that cicatrization goes on in the sclera as in other connective tissues, the loss of substance being rapidly made good. By the third day they find the clot invaded by fibroblastic cells of obscure origin. In two months the continuity of the scleral coat is reestablished by a tissue more dense and less regular than the normal sclera. Only the inclusion of some foreign tissue arrests the process, and only when this foreign tissue is permeable is permanent filtration and hypotonus established.

## ANTERIOR CHAMBER AND PUPIL.

MARCUS FEINGOLD, M. D., F. A. C. S.

NEW ORLEANS.

This section reviews the literature of 1917 regarding the anterior chamber and its contents, and the pupil and pupillary movements. Closely related material may be found in the sections dealing with the uveal tract, the visual tracts and centers, tumors, and injuries of the eye.

**DEVELOPMENT OF ANTERIOR CHAMBER.**—This has been studied by **Speciale-Cirincione** in a large number of human embryos. It is closely connected with the development of the cornea, ciliary muscle, iris angle, and pupillary membrane, none of which exist before the beginning of the second month of embryonic life. At that time, between the crystallin vesicle and the ectoderm, appears a layer of large cubic elements, the beginning of the posterior layer of the cornea. A little later a ring of thickening appears in front of this layer, the beginning of the true corneal tissue. A little later a mass triangular in section forms back of this layer on the anterolateral surface of the crystallin, and becomes vascular. At the tenth week the pigmented external layer of the optic vesicle becomes thickened at its margin, and undergoes rapid growth, advancing in front of the crystallin. Between it and the endothelial cushion in front, appears tissue that develops into the ciliary body.

During the third month it becomes possible to distinguish a lamina similar to that of the corneal endothelium, which becomes the endothelial layer of the iris, and these two endothelial layers become separated, leaving the beginning of the anterior chamber. Shortly after the formation of this primitive fissure, spaces appear in front of the endothelial cushion which ultimately become the canal of Schlemm. At the end of the fourth month the cornea and ciliary body are well distinguished, the crystallin has assumed its proper form and the canal of Schlemm is present. But the iris and anterior chamber remain very rudimentary. From the fourth to the seventh month the anterior chamber gradually in-

creases its size corresponding with the increase in the surface of the iris. At the end of the seventh month the pupillary membrane still adheres to the cornea, but this adhesion is becoming weakened and its easy separation accounts for the view that the anterior chamber is already complete. By the eighth month the pupillary membrane has become less vascular, and sometimes is completely atrophied. After this, altho the anterior chamber is complete, it remains very shallow, becoming deeper after birth.

**AQUEOUS HUMOR.**—**Secretion.** Analyzing in detail the experiments made to determine the secretion of the aqueous humor and passing criticism on all theories advanced as to its origin and the ways of its leaving the interior of the eye, *Magitot* (4) arrives at the conclusion that the experiments so far conducted do not sufficiently reproduce normal conditions and that the conclusions consequently do not apply to the normal aqueous humor. The renewal of the aqueous is very slow and there is no true current of the aqueous. During the third and fifth month of embryonic life the first aqueous is secreted by special neuroglial cells of true holocrin nature which accompany the hyaloid vessels. The fluid thus formed fills the meshes of the vitreous body, the anterior and posterior chambers. The fibrillary network of the vitreous is nothing but retinal neuroglia. After the cells have disappeared the aqueous in later life is only very slowly absorbed and the deficiency is replaced by products of the retinal neuroglial cells, the cells of the ora serrata and the clear cells of the ciliary body. The eyeball has independent lymph channels for the anterior and posterior portions in the form of perivascular sheaths. Lymph and aqueous hu-



mor are two different fluids. They do not come in direct contact and they do not mix. When the anterior chamber is emptied by puncture the fluid filling the chamber consists of serum transudate from the capillaries with an admixture of normal aqueous humor which is squeezed out of the meshes of the vitreous body. Gradually the serum is eliminated and the neuroglial cells dialyze slowly new normal aqueous.

By means of special forceps, **Seidel** clamped the iris to the lens, thereby closing the communication between the posterior and anterior chambers. A watch glass placed over the eye prevented the iris from getting dry; after several minutes' observation no moisture could be seen on the iris. Over the iris a small glass bell was placed for several minutes; no moisture could be seen. A small ear speculum with a 12.0 D. lens was placed on the iris; after several minutes a reflex appeared in the middle of the iris and on the iris margin, which reflex disappeared after careful sponging. From this can be concluded that only very scant secretion of the iris exists which can be estimated to be about 17 milligrams or about one-fourth of a drop per minute. The secretion of the ciliary body, on the other hand, can be estimated to be about three-fourths drop per minute. These measurements were made with the ocular tension equal to zero and consequently under conditions favoring increased secretion. The normal secretion, therefore, is very infinitesimal. These experiments do not permit the statement that the normal ocular tension is sufficient to prevent filtering from the iris vessels.

**CYST IN ANTERIOR CHAMBER.**—The cyst in the anterior chamber in **Goldberg's** case developed after a perforating wound of the eye, was of the pearl tumor type and consisted of epithelium and connective tissue which had been carried into the anterior chamber through the wound at the time of the accident. Two operations were performed, each time parts of the iris were removed with the tumor. The vision was good and extension into the deeper structures not notice-

able clinically. **Goldberg** considered the iris had been too deeply invaded by the growth to make radical removal possible.

#### REMAINS OF PUPILLARY MEMBRANE.

—**Jackson's** two cases of slight remains of pupillary membrane are extremely interesting because they illustrate how easily these conditions can be overlooked ever by careful examiners and even during repeated examinations. In the one case a brown mass was found near the upper edge of the pupil, apparently connected with the sphincter region and lying in front of it, together with a fine line on the anterior capsule. In the other patient a fine thread connecting two points of the anterior surface of the iris was only visible with dilated pupil, but was lying entirely in front of the iris and difficult to see as long as the pupil was contracted. **Ridley** reports a case in which a mass of pigment was present in the anterior chamber.

#### CENTERS OF PUPIL MOVEMENTS.—

**Dunn** proposes a new theory of the paths for the pupillary reflexes. The direct light reflex or "the primary light reflex" is, according to him, a reflex belonging to the automatic system, a vegetative reflex. Its path is: Retina, nerve cells to the pigment layer and along this to the ciliary region, where impressions are made upon the sensory nerve terminals therein, which impressions are conveyed to the ciliary ganglion, where they arouse efferent impressions along its motor fibers to the sphincter pupillae. The consensual light reflex is the result of nature's effort to obtain for any object directly looked at a like illumination in both eyes. Its path is: Retina, optic nerve, chiasm and tracts; from here a part goes to the center in the geniculate and quadrigeminal regions and then the fibers pass to the third nerve nuclei. Another part of the visual fibers goes to the sympathetic subthalamic ganglion, for the purpose of stimulating the action of the sympathetic on the dilator iridis. It is possible, he says, that the cones represent the terminal mechanism for the reception of the impulses to the geniculate and quadrigeminal nu-

clei, and the rods of the impulses to the subthalamic ganglion.

#### MYDRIASIS FROM NASAL OBSTRUCTION.

—**Lopez's** patient, a teacher, suffering with hypertrophy of the inferior turbinates, worse on the left side, showed during the attacks a certain parallelism between nasal obstruction, and diminution and discomfort of vision which compelled him to take off his glasses and to clean especially the one corresponding to the left eye. Improvement of vision followed with a reduction of the respiratory trouble. During the attacks the right pupil was normal, the left one was wide and did not respond to light or accommodation. No other nervous symptoms were present. A few minutes after the application of cocaine and protargol to the nares the mydriasis disappeared and both pupils reacted again normally. These symptoms were, according to Lopez, due to a spasm of the dilator pupillae as a result of an irritation of the sympathetic system started in its ramifications in the nose.

**MIOSIS—PARALYSIS OF CERVICAL SYMPATHETIC.**—Continuing their investigations of sympathetic nerve paralysis (Y. B., Vol. 12, 1915, p. 349), **Metzner** and **Wöfflin** arrive at the following conclusions: Following the extirpation of the superior cervical ganglion in the rabbit, the difference in the size of the pupils is permanent, while the vascular symptoms in the ear are only transitory. Mild stretching of the cervical sympathetic in the rabbit produced oculo-pupillary symptoms, which will disappear entirely at times. Depigmentation of the iris did not occur in any of the experiments in which the superior cervical ganglion had been extirpated or the nerve severed below. Miosis was a regular occurrence after middle ear evisceration. The vascular symptoms following destruction of the middle ear disappear after a while and the oculo-pupillary symptoms remain. The experiments on the rabbit give results similar to those gained by clinical observations on the human being; that the vascular changes will disappear while the oculo-pupillary symptoms remain unchanged. This is explained on

the assumption that the muscular apparatus of the blood vessels forms an independent and regulating tonus producing apparatus. The muscle fibers of the iris do not regain their tonus and they cannot be classed with the muscle fibers of the blood vessels on account of their different embryonic origin.

#### PHYSIOLOGIC INEQUALITY OF PUPILS.

—While both pupils are of the same size when the eyes are looking forward, **Tournay** finds that if the eyes look to one side, the pupil of that side becomes larger after a short while, while the other pupil contracts.

**ARGYLL ROBERTSON PUPIL.**—On the basis of his theory of the pupillary reflexes **Dunn** (see above), gives the following explanation for the Argyll-Robertson pupil: The specific toxins of lues have a selective action on the ciliary ganglion and if the lesion is here confined to the sensory elements, we have the abolition of the primary reflex of the ciliary ganglion which gives us the Argyll-Robertson pupils. After destruction of the sensory-motor and sensory-sympathetic connections in the ciliary ganglia motor impulses from the third nerve nuclei can still reach the sphincter of the pupil with the result that the Argyll Robertson pupil is a contracted one. While the sympathetic connections with the ciliary ganglia are destroyed, impulses from the sympathetic subthalamic centers can still reach the sphincter muscles via the long ciliary nerves and this explains why the pupils are kept equal during accommodation. If the toxins affect one ganglion more than the other, or sooner than the other, inequality of the pupils is the result.

**HEMIANOPIC PUPIL REACTIONS.**—Applying his theory of the paths of the pupillary reflexes to the hemianopic pupillary reaction **Dunn** says: "If the lesion is in the optic tract anterior to the point where the fibers to the corpora quadrigemina and subthalamic ganglia are given off, the consensual light reflex is abolished for no retinal born impulses can reach the quadrigeminal region." The primary light reflex is abolished as soon as "degeneration of the retinal cells takes place. The pri-

mary light reflex cannot then be aroused by the impact of light on the blind halves of the retina. Because, owing to the degeneration of the retinal fibers to those areas, there is no activity in the pigment cells in response to light rays." If the lesion be posterior to the point where the fibers to the third nerve and the subthalamie ganglion are given off, primary and consensual reflexes are present from the blind area because "degeneration of the optic fibers anterior to the corpora quadrigemina and the subthalamie ganglion do not take place and the retinal cells remain responsive to light impulses."

**PUPIL IN DEMENTIA PRECOX.**—In a study of the disorders of the pupil in dementia precox **Reichmann** enumerates the observations of others. The psycho-reflex (dilatation of pupil with mental effort, effects, etc.), and the reflex enlargement after sensory stimuli were often found absent by **Bumke** in

catatonic stupor. **Westphal** found the pupil horizontally oval and with diminished light reaction; he called it catatonic stiffness of the pupil. This change of the pupil has also been found in catatonic excitement by **Albrand**. Pressure on ovarian points produces dilatation of the pupil with absence of light reaction, according to **E. Meyer**. **Reichmann** in her own examinations found 61 cases with unusually large and 31 with very small pupils; in 47 cases the pupils were not round; they were unequal in 30 cases and eccentric in 17 cases; hippus was present in 8. In the normal individuals she found 20 very large and 14 very small pupils; 15 times the pupils were not round and 19 times unequal. In 11 cases the pupils were eccentric.

In membranous occlusion after an infection, following cataract operation, **Ziegler** succeeded by the use of phylacogen injections to produce complete absorption of the exudate.

## THE UVEAL TRACT.

CHARLES ZIMMERMANN, M. D., F. A. C. S.

MILWAUKEE, WISCONSIN.

This section reviews the literature of diseases of the uveal tract for the year 1917. Sympathetic uveitis will be considered in the section devoted to Sympathetic Disease; and many important papers bearing upon the etiology of uveal inflammations will be noticed in the section upon General Diseases, which will appear later in the year.

**ANOMALIES-HETEROCHROMIA IRIDIS.**—**Ellett** reported 6 cases of heterochromia iridis, 2 of these with uveitis, 2 with cataract, and 2 with cataract and glaucoma. These pathologic changes occurred, as always, in the lighter colored eye. The difference in color may be due to the fact that no pigmentation takes place in one eye; or that it has been present, but is subsequently lost through some pathologic process. **Ellett** thus summarizes these changes:

1. Evidence of a chronic low grade cyclitis.—Rarely is there any ciliary injection or manifest changes in the iris or choroid, or subjective symptoms, such as would attend these changes. What we do find are vitreous opacities

and deposits on the posterior surface of the cornea. In **Ellett's** experience, the vitreous opacities are much the more frequent.

2. Development of cataract.—The peculiarities of this cataract are, in the first place, the youth of the patient, since it generally appears before the age at which we would expect to see cataract. It would be well to examine carefully the cases of juvenile cataract, not of the zonular type, and cataract occurring in persons under fifty, and limited to one eye, for evidences of heterochromic cyclitis. Another peculiarity of this cataract is that the other eye is, and remains, free from a similar disorder. The cataract pursues an ir-



regular course, but since the progress of all cataracts is extremely uncertain, it is perfectly regular as regards this feature. It tends to progress to maturity and there is no contraindication to its removal.

3. The development of glaucoma simplex.—This is by no means the usual termination of this disease, as only a few such cases are recorded. Ellett has seen only two such, although it has been carefully looked for. The glaucoma may follow extraction of the lens, or it may occur in an eye in which the cataractous lens is still present. The underlying cause of this condition is not known. Most of the speculation on the subject is along the lines of a lesion of the cervical sympathetic. Cases of injuries to the sympathetic nerve during birth and in other ways have been recorded, in which heterochromia iridis followed, but in several such cases of injury reported from the European battlefields nothing of the kind has been observed.

Ellett also gives under "allied conditions" the clinical histories of 5 cases of chronic uveitis with some attendant discoloration of the iris, presenting vitreous opacities alone or vitreous opacities with visible evidences of inflammatory processes in the iris, ciliary body, or choroid. Associated with or following these changes is an increase in intraocular tension. When this is present as an accompaniment of iritis, there seem to be two classes of cases—one in which the usual treatment of iritis is followed by a subsidence of the hypertonus, and another group in which the hypertonus is aggravated by atropin. The differentiation of these two is difficult, and the management of the second group is even more difficult. Some of the difficulties will be indicated by perusal of the case histories.

**ANIRIDIA.**—Hill reported the case of a girl, aged nine years, whose vision had always been poor; the eyes had always oscillated and the pupils were very large. There seemed to be practically absence of the iris; the ciliary processes were not visible; the cornea, lens and vitreous were clear, the fundus appeared normal; there was myo-

pia and astigmatism. Family history negative; no history of similar ocular defects obtainable. The nystagmoid movements resembled the searching movements of an almost blind eye, more than nystagmus. At times, a vertical, and also at times a horizontal, motion is more noticeable than the others. She had glasses three years ago correcting 2.50 D. myopia and 3.25 D. astigmatism, which now give 20/100 vision. Refraction showed a little more than 2.50 D.M. in each eye, and —4. cylinders in each eye gave  $V=21/70$ . The absence of the corneal or lenticular opacities seemed to be somewhat unusual and the absence of any evidence of heredity was very unusual.

It is supposed that absence of the iris is the particular eye defect which most often shows a history of some ocular defect in past generations. The theory generally accepted is that it is a defect of development and not the result of an intrauterine inflammation. Hill thought that perhaps the theory of Hess, supported by George Coats, that there is a mesodermal structure advancing around the lens which means a new growth and the iris eventually protrudes these two, allowing the entrance of the iris between the lens and cornea, was a good one. All of the theories suppose that there is something which interferes with the pushing in of the iris between the cornea and the lens. Hill emphasized the frequent inflammatory reaction after any attempt to operate upon these cases. So far as he knew there were very few reports on the anatomic findings in these eyes. Generally there were the rudiments of the ciliary processes; there was some stump of the iris which had been adherent, and there had been reported a considerable overdevelopment of the pectinate ligament, the condition remaining in the adult eye as it was in the fetal eye.

In the discussion Mann reported a similar case in which the best vision he could obtain was, for the right eye, —9. gave 20/200, and the left —5.5 gave 10/200. The patient was a drug clerk who was using —6. and said he could

not read well with his glasses. The lens had a number of striations and the fundus was indistinct. He was given bifocals, and with the addition of +3.50 for close work he could read Jaeger No. 6. There was no heredity. In **Small's** case, aside from the aniridia, which he considered congenital, both corneas were sclerotic. The patient was thirty years old; she had gone to school and could see perfectly well until she was about fourteen. The first symptom was a cataract which developed in the right eye. The white spot appeared on the cornea shortly afterward, and increased until it covered the lower part of the cornea. In the left eye she has striae, visible around the periphery of the lens. There was marked lateral nystagmus. Family history was negative.

**POLYCORIA.**—**Chance** presented a case of imperfection of the iris, which he considered to be allied with polycoria, in an Italian girl of 11, who had a history of inflammation of the left eye in her early childhood. A linear opacity in the cornea doubtless interfered so much with the sight that the school physician had sent the case for refraction. There are no visible signs of connection between the corneal nebula and the iris; nor evidences of disease of the lens, choroid, or retina. A horizontal coloboma appeared to be at the outer side, which, on closer inspection, consisted of imperfectly developed superficial layers of iris, with a dense hyperplastic over-development of the deeper fibrous layer. The fibers extended quite visibly for some distance above and below the main aperture, and shone through the feebly developed overlying layers.

Directly opposite at the nasal side, there is a circular aperture, which, when the ophthalmoscope is used, transmits the light thru a distinctly fibrous background. In the right eye, in an exactly corresponding position at the nasal side, is a similarly rounded area which has the appearance of being only the deepening of a crypt, and does not transmit the fundus glare. Atropin effected complete mydriasis in the right, when the eye was found to be entirely

normal. Atropin in the left caused contraction of the nasal pillar, but apparently had no effect on the temporal.

**COLOBOMA.**—The extreme difficulty, and in many instances the absolute impossibility, of adequately solving the etiologic problem in certain faults in ocular development is illustrated in the pronounced defects in the cases of the mother and two children in the one family reported by **Ring**, and it is suggested that there may be an association between a vicious prenatal environment and the development of the ocular defect. The mother shows the following condition: O. D. The iris below is notched or slightly folded upon itself, and the pupil when dilated alters the position but slightly. At the posterior lens pole is a dense white opacity. Nuclear riders are present and numerous dots of intensive denseness suggestive of calcareous changes are scattered throughout the largely opaque lens. O. S. Coloboma of the iris below, with similar irregular lens opacity. Microcornea in each.

In the child exhibited, microphthalmos is present in each eye. In the posterior cortex of the right lens is an irregularly round chalky nodule, and the area of the nucleus is marked by a number of riders and several small dotlike opacities. O. S. Same character of nodule, nuclear area is present but less distinct, chalky dots absent. In both eyes the iris below shows a concave depression corresponding in location to the coloboma of the mother. The second child with a congenital defect died at five months, but had microphthalmos, double coloboma, and lenticular opacities similar to those of the mother and child shown.

The rather vicious prenatal history of this mother is of interest. On the paternal side the father was a confirmed alcoholic and user of tobacco, now dead. The mother is living, aged sixty-two years. During her married life she was compelled to submit to exceedingly harsh treatment, received insufficient food and at times lacked even shelter. She gave birth to eight children—four boys and four girls—at periods of about twenty-two months.

the patient being the fourth in order. Previous to the birth of the patient the ill-treatment accorded her mother was particularly wretched.

The patient was a victim of poor health during the first two years of her life, passed through measles and a very severe attack of typhoid fever, but from twelve years of age and onward she has had very little physical discomfort. Her first child died at seven months of gastro-enteritis; the second, one of the patients shown; the third dying at five months who presented the congenital defect referred to, and a fourth child, now aged four months, shows no lesions whatever in either iris, choroid, or lens.

Ring says that a number of the textbooks fail to mention the association of congenital cataract with the iris defect; but that Fuchs refers to the frequency with which cataract develops with coloboma of the choroid, and regards the cataract as usually complicated and inoperable. In view of the increasing haze of each lens Ring feels warranted in doing a series of careful dissections, beginning with a vertical incision through capsule into lens extending from the lower to the upper margin of the dilated pupil. In the discussion before the Ophthalmic Section of the College of Physicians of Philadelphia, the consensus of opinion favored the procedure proposed.

**Zentmayer** observed in a woman, aged 35 years, who stated that her vision had always been defective especially in O. D., two large wing-shaped areas of defective choroid, spreading from the optic nerve to the temporal and nasal parts of the fundus. The defect in the choroid was complete. The papilla was oval and presented at the scleral ring on the temporal side a porous opticus thru which the retinal vessels emerged. Myopia 8 D. The eye was divergent, but this had been corrected by an O'Connor advancement of the internal rectus. O. S.: The choroidal defect was much less extensive and not complete, the choroidal vessels being present and showing, in places, sclerosis. Myopia 3 D.

**Grimsdale** showed a case of congeni-

tal absence of the choroid. The masses of pigment were not heaped up, but apparently lay flat. Vessels were scattered over the greater part of the white sclerotic.

**Fagin** presented a man, aged 45, who noticed lately that for reading he has had to strain his eyes. The vision in the left eye is very poor, and has been for some years. Objects are blurred and indistinct. Right fundus normal; the left shows spots of choroiditis and congenital disarrangement of blood vessels with some pigmentation in places in front of blood vessels. V. = 4/200, unimproved with glass. Fagin had been unable to find anything that looked like it in any work upon the fundus. In the discussion Ellett thought the condition was congenital and is what has been described as the "Medusa Head" appearance of the nerve. The pigment in some places lies in front of the blood vessels, but one conspicuous lesion between the nerve and the macula is evidently deeper than the retina. While this does not have the appearance of a coloboma of the choroid it might be something of that nature.

**ANATOMY AND PHYSIOLOGY.**—With extremely delicate sections **Susita** was able to prove that the lower epithelial cells of the iris belong to the dilator system, a fact that has never before been proven.

**Joseph** found that *adrenalin* solutions of various concentrations, when applied to the sphincter pupillae after either partial or complete excision of the muscle, cause a prompt and unmistakable relaxation. This relaxation is maximal following the use of stronger *adrenalin* solutions (1:100 to 1:1,000,000). Very dilute solutions (1:10,000,000), on the other hand, produce only a partial relaxation. The duration of the effect varies directly with the concentration of the solution used; after 1:20,000,000 recovery may be complete within two to five minutes, whereas after 1:1,000 two hours or more may be necessary for recovery. The sphincter muscles of the following irides were tested: Bovine, swine, sheep, goat and human. The changes in sphincter length



were recorded graphically. These experiments demonstrated that the sphincter muscle of the iris is capable of responding to a suitable stimulus in a sense that is exactly the opposite of shortening (contraction), namely by lengthening (relaxation). In its response to adrenalin the sphincter of the iris resembles the intestinal.

**ETIOLOGY OF UVEITIS.**—According to **Woods** the anaphylactic theory of sympathetic ophthalmia assumes that the disintegrating uveal tissue in the exciting eye is absorbed and creates a hypersensitiveness of the second eye. A reaction between the antibodies formed in the sympathizing eye, and the exciting uvea, produces an intoxication which is manifested clinically as a sympathetic ophthalmia. In his previous papers of this series (1, 2), **Woods** has shown that if the eyes of an animal, generally sensitized to a given protein, are perfused with normal defibrinated blood to which the same protein has been added, anaphylactic phenomena result in the eye. These phenomena consisted in a marked contraction of the pupil and the occurrence of hemorrhages in the fundi. This ocular reaction was utilized to determine the antigenic properties of uveal tissue. As a result of numerous perfusion experiments, it was found that uveal tissue could act as antigen in animals of the same species, and could produce anaphylactic phenomena in the eye of a generally sensitized animal, by intoxication through the blood stream. Further, uveal tissue was organ specific, anaphylactic intoxication being produced by perfusion of uvea of another species. At the same time, it was shown that there was considerable reason to believe that the pigment in the uveal tract was the constituent uveal tissue responsible for these remarkable antigenic properties.

Accordingly, using the ocular anaphylactic reaction to perfusion as the method, an experimental study of this question has been made by **Woods**. Having prepared finally a pigment emulsion which is at least relatively pure, is readily absorbed, and which can be utilized in perfusion without causing thrombosis or plugging, **W.**

proved by perfusion experiments that this pigment is the constituent of the uveal tract responsible for the peculiar antigenic properties of uveal tissue. This pigment is a nitrogen, hydrogen, carbon, oxygen, iron, sulphur, and phosphorus containing body, is either a protein or closely allied to proteins, possesses antigenic properties, can act as antigen in the homologous animal, and is organ specific, and not species specific. These antigenic properties of pigment are those required if the anaphylactic theory of sympathetic ophthalmia is a possibility. The findings reported here confirm **Elschnig's** findings, and give a definite scientific basis to the anaphylactic theory of sympathetic ophthalmia.

Literature abounds in clinical histories demonstrating the importance of *focal infection* in the etiology of iritis, iridocyclitis and choroiditis, from: the tonsils by **Babbitt, Dulaney, Dunn, McCool, Sobotky**; pyorrhea, and alveolar abscesses by **Black, Foster, Gradle, Hardy, Lang, Levy, McCool, Oulton, Paton, Reeder, Rowe, Swift, Thompson, Turner**; suppuration of middle ear by **Dulaney**; nasal sinuses by **Dulaney**, and **Irons and Brown**; ulceration of the cervix by **Taylor**; alimentary tract in 23 patients of **Lang**; constipation by **Taylor and Thompson**; dysentery by **Morax**; appendicitis by **Reeder**; affections of the bladder due to infection with bacterium coli, which may have come from the alimentary tract in view of the presence of constipation in the cases of **Davies**; chronic, urethral infection with partial stricture by **Babbitt**; genito-urinary system by **Lang**; septic focus on the skin or on a mucous membrane or cavity in 10 patients of **Lang**; ulcerated matrix of a very badly ingrowing toenail by **Taylor**; influenza by **Lang and Smith**, showing that if the focus of infection is found and eliminated, a brilliant result can be obtained. In 200 cases of iritis in **Lang's** private practice the various causes occurred in the following percentages: syphilis, 6; gonorrhea, 12; tubercle, 11; general affections, 8.5; other causes, 25.5; pyorrhea, 37.

In no less than 74 of the 200 patients of **Lang** the sole cause found was pyorrhea. When these cases were seen early and the offending stumps or teeth were removed the clearing up of the iritis was strikingly rapid. Of the remaining cases 22 had pyorrhea in association with other diseased condition. In the case in which pyorrhea alone was found there were twice as many women as men. Of the total number 48 per cent had their mouths affected. It would be of great value if members of the dental profession could recommend a preventive of this appalling state of affairs, which seemed to lay the foundation for numberless diseases involving all parts of the anatomy, including the eye.

**Swift** emphasizes the importance of focal infection in the alveolar process. There are in general three types of teeth in which **Swift** looks for the source of trouble: (1) Crowned teeth. As a general rule a dentist has cut down and destroyed or exposed portion of the tooth in cases where a crown is used. It is in that type of decay wherein the tooth is nearly gone and a root alone is left that crowns are advised. In order to hold the crown two things are necessary: First, to destroy the nerve, devitalization; and, second, to form a band around the root to fix the crown. Both of these lead to abscesses. The result of faulty filling of the nerve canal is an apical abscess at the root; of faulty bands on the outside, pyorrhea.

The second type is the peg tooth. Of all poor dentistry pegging of teeth takes first place. If this is doubted, take a series of X-ray films and see how frequently the peg misses entirely the canal, perforates the wall of the root. The dentist purposely drills at the side of the canal for greater support but perforates the outer wall. This is especially true in front teeth owing to the fact that the root often bends backward. The frequency of apical and marginal or lateral abscesses has convinced **Swift** of the danger of its presence in all cases of peg teeth.

The third type appears in old broken roots. These can easily be diagnosed;

usually they are loose. The old roots where the tooth has broken off years before, small portions of roots left by the dentist, malformed roots, misplaced roots and finally decayed roots are the source of alveolar abscesses. They are hard to find, often found only accidentally or after filming for another tooth abscess.

**Turner** thinks that much might be done in the way of prevention by avoiding sticky foods. He had looked through the skulls of various races and various ages of mankind, as well as skulls of animals, and they followed the one rule: Where the food was sticky, starchy, and sugary, decay and pyorrhea were found; where the food was only meat, neither decay nor pyorrhea existed.

**MODES OF INFECTION.**—**Babbitt** reminds us that the eye contains every tissue necessary for the growth of bacterial organisms, besides the highly sensitized nervous tissues which readily succumb to bacterial toxins. The abundant blood supply with the terminal arteries and capillaries are further conducive to the localization of bacteria that circulate in the fluids of the body. **Lakin** strongly supported the view that in iritis a microbial infection was at work, due to an embolic process. He believed the reason the iris was affected was that at the junction of the iris and the ciliary body there was a change in vascularity from a highly vascular to (comparatively) an avascular arrangement, the later containing less hemoglobin and less oxygen, and hence organisms were able to flourish there.

**Turner** discussed the subject from the standpoint of the odontologist, saying that probably the causal agent was an infection by means of the blood stream or lymph stream, either toxic or, more probably, actually microbial; and seldom by direct continuity of tissue. Only seldom was a mouth seen which was free from the possibility of infection. Even when the last tooth had gone and a plate was substituted the danger had not gone, for an artefact factor was introduced in the production of dental sepsis. When the periodon-

tal sulcus was infected it was a practically undrainable area. When sticky food was eaten the area referred to, close to the neck of the tooth was not cleansed, and a nidus was thus formed for the multiplication of germs. A second source of sepsis was by caries and a septic tooth. A dead tooth always was septic so long as it remained in the mouth.

The general impression which has hitherto obtained is that these metastases occur thru the blood stream, but **Levy's** observations have led him to the conclusion that this belief is not substantiated by the clinical evidence. With one exception, all the patients cured or materially benefited presented dental infection on the same side as the affected eye. If the belief that these metastases occurred thru the blood stream was correct, Levy feels he should have observed more cases in which cure or material improvement occurred, when the dental infection was on the opposite side from the affected eye. Failing to have seen such cases, he has been led to the conclusion that these eye metastases, occurring from primary dental foci, travel thru lymphatic channels. He has recently endeavored to demonstrate the correctness or fallacy of this belief by means of animal experimentation, but unfortunately, the number of experiments carried out so far are too few to arrive at any conclusion. Animals injected intravenously or thru lymphatic channels have all died without presenting any eye lesion whatsoever. L. has been using rabbits for this work. But as they are particularly susceptible to streptococcus infections and succumb very readily thereto he feels he will have to secure animals less susceptible in order to carry on further investigation.

According to **Swift** we must have, first, the toxic material in the blood in a greater degree than the individual can easily assimilate; in other words, there must be a residual amount of toxic substance in the blood. Second, there must be some change in the eye from the normal which causes an additional decrease in the protective pro-

cesses of the eye. If it is strain it may result in a cyclitis, a trauma may result in a cyclitis, iritis, scleritis, etc. If these two essential points, presence of residual toxic substances in the blood and lowered resistance locally, are essential in every case of eye lesion due to focal infection, Swift asks, does it not appear rational to assume that one should consider all etiologic factors as essential and possible causes of the general toxicity residual in the blood rather than exciting causes of, say a simple iritis?

With the exception of the peridental tissues, **Dunn** considers it highly probable that a chronically infected tonsillar crypt is more frequently the origin of inflammation of the iris than disturbances anywhere else along the upper mucous membranes. The crypts of the tonsils, furnishing heat, nourishing food, and rest, are ideal places for germ growth. In early life the continued presence of microorganisms and their products within the crypt results in tonsillar hypertrophy. As years go by, this hypertrophy to a greater or less extent disappears and it frequently happens that the crypts are left enlarged and so distorted that their contents cannot be emptied during the act of swallowing. The continued presence within the crypt of the cast off epithelial cells, live and dead microorganisms and their products, results in the formation of the well known dirty, whitish, stinking masses and also, sooner or later, as the result of pressure in the destruction of the epithelial lining of the crypts, and often in superficial ulceration of the underlying tissues. These three things may persist in varying degrees thruout life and the passage into the blood of the germs and their products present in the crypts is often the cause of inflammation in distant organs resulting in e. g., thyroid hypertrophy, articular rheumatism, appendicitis, endocarditis, etc. Where the cryptal mucous membrane becomes ulcerated, and it often does, there results a more or less constant passage into the blood of microorganisms and their products. This helps us also to understand the recurrence of



local secondary inflammations such as iritis, focal choroiditis, scleritis, etc.

Of the microorganisms which pass into the blood from the infected crypts the vast majority are destroyed by the blood cells before they reach tissues where the conditions are such that they can intrench themselves and produce local inflammation. When, however, they have once found such a receptive focus and have inflamed it, they often leave this focus, even tho driven out by treatment, in such a weakened condition that the same species of microorganism can later reproduce there an inflammation similar to the first. Consideration of the pictures presented in chronic tonsillar crypts will make it clear how in the peridental infection we have to deal with similar conditions. In iritis or focal choroiditis we often find disease of both the dental regions and the tonsillar crypts, and it is impossible to decide from which of the two the microorganic invasion which has resulted in the ocular inflammation is taking place. It will be necessary in such cases to remove both foci to obtain the cure we are seeking. **Ormond** thought **Turner's** contentions proved rather too much, for on his theory iritis should be much more common than was the case, especially in out-patient ophthalmic practice, where the condition of the general run of mouths was deplorable.

**ARTHRITIC IRITIS.**—**Smith** has been working at the causation of arthritic conditions for eight years, and the evidences which he had obtained that bacteria, or the toxins, were the chief causes of arthritic trouble were derived by studying vitiated conditions of blood, most of which he believed were brought about by bacteria. The toxins and the bacteria prepared the ground; it was the element of strain or injury which determined the site. Therefore he had considered it sound practice to recommend every arthritic person to have his refraction carefully tested by an expert, for he believed many cases

of iritis might be prevented if eye-strain were avoided. He examined the blood of 450 people, most of them suffering from "chronic rheumatism" or gout. In 8 iritis was a secondary trouble. In 4 of the cases the influenza bacillus or its toxin was answerable, in 3 the tubercle bacillus, and gonorrhea in only 2 cases. The toxins of streptococci and staphylococci were present in all the 8 cases, and in 3 bacillus pyocyaneus, which latter was a very depressing organism and was a common inhabitant of the alimentary tract.

**Dulaney** considers rheumatism itself in the usual sense due to a focus of infection some place in the body. Iritis occupies the same position in regard to other infections as does rheumatism, especially those infections where the cocci are the offending organisms. **De Schweinitz** and **How** recorded the clinical history of a boy, aged five, with chronic polyarthritis, and the family history of tuberculosis on the father's side. At the age of three years the child first developed arthritis of both knees. Two years later the left elbow, both wrists, and the joints of several fingers were involved, with slight ankylosis of the jaw and enlargement of the axillary, cervical and inguinal glands. No good effect followed removal of the tonsils. Tuberculosis tests and Wassermann, thrice repeated, negative. About three years after the first arthritic process had begun, iritis of the right eye developed, which subsided under treatment, only a few posterior synechiae remaining. Not so with the left eye, which, as a result of numerous relapses, passed into a condition of chronic irido-cyclitis, with infiltration of the cornea, especially in its lower part, with slight vascularization, filling of the anterior chamber with yellowish exudate, traversed with a band of hemorrhage. The constant exacerbations of cyclitis, uninfluenced by treatment, necessitated enucleation.

(Continued next month)

# DIGEST OF THE LITERATURE.

## THE UVEAL TRACT.

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MILWAUKEE, WISCONSIN.

(Continued from March issue)

The microscopic examination revealed swollen and edematous corneal plates, with capillary vessels in the middle layers of the corneal stroma, the anterior chamber filled with an albuminous exudate. Completely closing off the anterior chamber posteriorly there was a dense band of fibrous tissue, about two-thirds the thickness of the cornea, and somewhat resembling it in structure. This curtainlike band, which extended from one angle of the anterior chamber almost to the other angle was somewhat adherent to the iris, although sharply differentiated from it in structure. The iris itself was densely infiltrated with small lymphoid cells; and thruout the stroma, but chiefly at its base, were numerous large plasma cells. The ciliary muscle was atrophic and contained large masses of round cells and lymphocytes. In the lens were masses of vesicular cells which appeared to correspond to the "blasenzellen" of Wedl. The band of fibrous tissue described crossing the anterior chamber, corresponded in appearance almost exactly to the one illustrated in Fig. 191 in Parson's *Pathology of the Eye*, Vol. i, Part I, p. 290.

Langdon's patient, a boy, aged thirteen, was seized ten days after pneumonia, with a severe pain in the left knee. Shortly afterward both hips, ankles, and wrists, were involved. He was admitted to the Orthopedic Hospital, with great stiffness of the joints, tenderness, bed-sores on his back, and a temperature varying between 99° to 102° F. Three weeks after admission he had a severe pain in O. D., with some ciliary injection, and a small gray node developed at the upper inner pupillary margin, 1 mm. in diameter. In

forty-eight hours it had tripled in size, and in another twenty-four had begun to send out streamers of soft gray exudate which in two days filled the entire upper inner quadrant of the anterior chamber. The general diagnosis had been thought to be either an aberrant form of tubercular infection or a low-grade purulent organism. The serum from a tapped joint was clear and gave no culture growth. On the third day of the ocular condition, 1/500 mgm. of T. R. was given with no effect, save the temperature then remained between 99° and 100° F. In forty-eight hours an injection of 1/300 mgm. was given and again no change except the temperature stayed between 99° and 99.5° F. Another joint yielded a cloudy fluid with no growth, even on dextrose-ascites-agar anaërobic stabs. Two sets of diplococci were found in a smear. A third T. R. (1/300 mgm.) was given, and after this there was noticeable absorption of the exudate, which in forty-eight hours had disappeared, leaving the node filling in the pupillary area. The iris did not dilate well under large doses of atropin, and the node had taken on a distinctly yellowish tinge, as though purulent, and light perception was lost. It seemed possible that the diplococci found were broken chains of streptococci.

GOUTY IRITIS.—Clarke believed that a point of strain or traumatism was the point for the manifestation of gout when it was in the system. If the metatarsal joint was defective, gout manifested itself there; if eyestrain were present, iritis would probably occur. He always tried correction of the latter before recommending iridectomy. Ormond asked whether rheu-

matic fever produced iritis at all? He also asked for a scientific definition of gout. He did not think it possible that errors of refraction and eyestrain could cause iritis. **Wessely** injected a sterile suspension of crystallin monosodic urat in physiologic salt solution into the cornea, under the conjunctiva, and into the anterior chamber, of rabbits. The monosodic salt was used for maintaining the analogy to human pathology, as not only the gout tophi but also the uric acid circulating in the blood consist of it. Injections into the cornea caused almost no irritation, and the crystals were absorbed or cast off in a few days, leaving a tender scar merely corresponding to the puncture. Injections under the conjunctiva produced violent hyperemia and chemosis for a few days, with gradual absorption of the urat without leaving greater disturbances. Microscopically a dense infiltration with leucocytes remained for a long time in the focus and the surrounding tissues of conjunctiva and sclera, followed later on by necrotic changes. In the majority of experiments the reaction after injections of from 0.5 to 1 cg. into the anterior chamber was comparatively slight. In some cases the aqueous was slightly opaque and the iris swollen, with a few posterior synechiae, which all disappeared after a few days. The opaque swelling of the corneal substance was attributed to the toxic action of sedimented urat at the posterior surface of the cornea. The opacity gradually disappeared under the development of blood vessels from the marginal loops.

Microscopically the deposit of urates is enveloped and permeated by coagula of fibrin, and there is an abundant immigration of leucocytes and numerous eosinophiles. Giant cells are found from 7 to 14 days later. The endothelium of Descemet's membrane at the extreme sinus shows proliferation and participates in the formation of numerous stratified flat cells, almost completely filling the space of Fontana. The parenchyma of the cornea is thickened to twice its size and infiltrated with leucocytes. After four weeks these macroscopic and microscopic

changes disappear almost completely, and a nearly normal condition remains for about a month. Then a gradually waxing opacity of the cornea develops in the area corresponding to the original site of the urates, due to necrotic processes. Descemet's membrane is separated into two lamellae, enclosing a coarse fibrillar new formed tissue. This vascular tissue is best characterized as pannus of the posterior surface of the cornea. In the third and fourth months minute glistening crystals develop in this tissue; which Wessely so far was not able to determine as urates, altho he thinks they are urates.

The interesting and important feature of the experiments lies in this late sedimentation of crystals and the slow necrotic process due to the very gradual and chronic poisonous action. According to Wessely there is scarcely any other explanation but that the noxious agent remains during the whole time in some form fixed in the tissue, and it may be supposed to play a constant rôle in the slowly developing changes. He believes that his experiments bring us nearer to the conception that even without local sedimentation of uric crystals merely dissolved monosodic urat circulating in the body may evolve toxic effects on certain tissues of the eye.

**GONORRHEAL IRITIS.**—According to **Lang**, gonorrhea was not usually considered so potent a cause, but hospital practice would probably show a higher percentage than 12 in his 200 cases of iritis. Now, however, that the infection had been shown to linger in the genito-urinary system for years, relapses could be largely prevented by local treatment applied in that region. **Ormond** says an important point is as to the duration in an active stage of the gonococcus in the tissues; it had been asserted that it remained in the crypts of the prostate for 15 or more years, but that did not coincide with other statements.

**CHOROIDITIS.**—**Wallace** presented a patient, aged 20, with choroiditis, who noticed interference with vision four years ago. R. V. 7/10. L. V. 20/15. It is not progressing so far as vision is



concerned. Right eye: Temporal field involved from disc outward. Left eye: Superior and superior-temporal fields diseased. Extreme superior patch of white very large and looks as if enameled or like a piece of china. One very interesting thing is the presence of a vitreous string between the disc and fovea, several millimeters long.

**Lang** says that at one time, syphilis was regarded as the chief cause of iritis and probably hospital figures would show an increase on his 6 per cent; but with the modern antisiphilitic methods he thought it would become the rarest cause, for gummata of iris and ciliary body could be made to melt away without the disorganization of the eye which was formerly seen. In **Wallace's** patient, aged 25, with specific choroiditis, vision began to fail last August. Left eye became worse gradually, until three months ago, when the process increased. L. vision: Fingers at 12 feet. Wassermann plus 4. Fundus: Very extensive changes in all stages of the disease. Temporal field almost wholly involved, far up and far down. Nasal field and superior not so many points. Can see jet black and ivory white spots various sizes. At places pearly, shiny pinhead size spots. Across the superior field a very dim, almost indistinguishable line is seen, looks like a blood vessel but can see no junction with other vessels and lies in front of and at right angles to the arteries and veins. Probably 2 mm. wide and side outline more distinct, of pinkish white color and fades to an indistinguishable outline of other side.

**Holloway** exhibited a boy, aged thirteen, with disseminated choroiditis first seen March 13, 1916, at which time his eyes showed the following conditions: Vision R. 6/12. L. 6/15. In the right eye a few vitreous opacities, disc was pinkish yellow in tint. Studding the choroid were innumerable lesions, varying in size from a split pea to half the disc diameter. Many of these presented a grayish white, cottonlike appearance, and were surmounted centrally or eccentrically by a ring of pigment having an apparent diameter of about 4 mm., the circumference of the

lesion not being pigmented. In a few instances the pigmentation consisted of a solid clump about the same size as the rings. Some of the lesions were of a yellowish tint, and one near the macula was without pigmentation, whitish in color, and surrounded by a narrow yellowish areola. In a few instances the retinal vessels were partially covered by pigment. In the left eye there were a few vitreous opacities, with a low-grade neuritis, a diffuse superficial retino-choroiditis most perceptible in the macular region; and in the periphery there were a few vague choroidal foci without pigmentation. General examination revealed slight enlargement of the cervical lymph glands, some enlargement of the tonsils, and a suggestion of a rachitic rosary. Wassermann positive. Holloway stated that he had never seen a case before quite so striking. He believed the condition presented various stages of an active process depending upon hereditary lues.

**UVEAL TUBERCULOSIS.**—The tuberculosis cases of *iritis* of **Lang** (11%) were equally divided between the sexes, and the average age of the patients in this form was 25 years, all but two being between 16 and 35 years of age. According to **Koeppé** pathologic deposits are found on the posterior surface of the cornea in every case of iritis, whether tuberculous, serous, or in any other form. These deposits look like droplets, fibers, stars, or conglomerates. In the form with droplets the posterior surface of the cornea looks bedewed. It is probable that these droplets are insufficiently coagulated fibrin. They appear also in inflammation of other etiologies. The author has observed them, also, after the complete cure of an iritis. The fibers (filaments of fibrin) may be likened to picked cotton fibers. This is evidently a late stage of the droplets. The star form is very common. The substance is disposed in a manner reminding one of snow flakes. There is the impression that there is an additional moisture capable of crystallization. The amorphous conglomerates have a different aspect. These are like elevations on the

endothelium, often in the form of transparent nodules. After a certain time they are covered with very fine pigment particles like pulverized pepper. Their volume seems to grow by apposition, like the stars, and they reach varying sizes.

These forms show themselves in the course of different varieties and stages of tuberculosis of the iris, and in most cases even side by side. Thanks to the Nernst lamp the diagnosis of iritis can be made by the examination of the posterior surface of the cornea alone, at a period when this would have been impossible with the corneal microscope alone. The conglomerates and the nodules are, moreover, suspicious of tuberculosis.

Deposits are also observed, though less frequently, on the anterior lens capsule. These formations are much thinner than those on Descemet's membrane, often barely visible, or even absent. From a differential diagnostic standpoint they can be used even less than the other. In serous iritis they are always found in the aqueous humor. They are not of any importance from the point of differential diagnosis when searching for the etiology. They are composed of fibrin, cellular elements, pigment particles and sometimes erythrocytes. The visibility of light rays in the anterior chamber is a precious symptom of the existence of an intraocular pathologic modification.

**CHOROIDAL TUBERCULOSIS.**—**Jackson** presented a young woman who, until nineteen years of age, had vision of 20/20 in her right eye, which suddenly diminished to 5/200. Ophthalmoscopic examination showed a central chorioretinitis, with a large area of edema of the adjoining retina. The ophthalmologists, under whose care she then was, "were unable to determine any cause for the condition," altho careful clinical examination of her general condition was made, which did not, however, include tuberculin tests. She was given pilocarpin sweats, mercurial inunctions, and Donovan's solution. The patch in the macula went on to choroidal atrophy with pigment deposit. She was first

seen by Jackson eight months later. Vision in this eye was 4/45, with slight pallor of the outer quadrant of the optic disc, and choroidal atrophy 2/3 of a disc diameter in the macula, with a small pigment patch at the fovea. The left eye was and has remained normal.

The condition continued practically unchanged for 16 months. Then vision grew worse in the right eye. There was a noticeable extension of the scotoma downwards. Ten days later swelling and gray deposits to the nasal side of the old patch of choroidal atrophy were seen. There was some pain and pericorneal hyperemia, with rise of tension to 4 on the Gradle instrument (presumed pressure 60 mm.). Shortly before this, swelling and soreness had developed in the metatarsophalangeal joint of the great toe. Tuberculin injections gave both general and focal reactions. Under tuberculin treatment the process subsided, the additional patch of choroid undergoing atrophy, the nasal larger portions of the lesion now seen in the macula. Vision reduced to R. 2/60 eccentric. There has been no evidence of fresh disease for more than 4 years. The patient was somewhat out of health when sent to Colorado, but has never given evidence of pulmonary tuberculosis.

**UVEAL LESIONS WITH VARIOUS GENERAL DISEASES.**—**Demaria** records two interesting cases of general uveitis in subjects affected with *vittiligo*, far enough advanced to render both patients blind. The first case occurred in a boy of 18. Wassermann and v. Pirquet negative. Injection of tuberculin caused marked general reaction as well as focal reaction in eye.

The second case, a woman of 45, in whom the tuberculin reaction was negative, but Wassermann positive. In the first case an iridectomy was performed on each eye without benefit, and the ocular condition did not respond to tuberculin. At present there is bare perception of light. The second case had iridectomy performed previously to coming under Demaria's care, tension is low and the eyes practically blind. Demaria discusses the



cases of ocular affections occurring in patients with vitiligo which have been reported by Erdmann, Gilbert and Komoto.

**Masuda** observed acute disseminated choroiditis with *scrofuloderma* in a 15-year-old scrofulous patient, who likewise had hemorrhagic nephritis. There was a suppurating lymphatic gland of the neck, which had partly cicatrized and had given rise to typical scrofuloderma in its neighborhood. Chemosis and swelling of the eyelids appeared on each eye, accompanied by dull pain. Ophthalmoscopic examination showed pale yellowish spots, more or less round, a few of which were of the size of the papilla. These spots were not accompanied by pigment and lay under the retinal vessels. They were more frequent in the equatorial zone, leaving the neighborhood of the papilla and macula free. The affection was more pronounced in R. than in L. It was interesting to note that the fundus disease appeared and proceeded with the swelling of the eyelids. The author thinks that this form of choroiditis has not yet been described.

**Marquez's** patient, a physician, complained of steamininess of vision, first noticed in the morning and persisting during the day. Three days later a sudden pain was felt in the eye. The pain subsequently disappeared but left the eyeball and surrounding parts very sensitive. The cloudiness of vision increased. *Malaria* being suspected, quinin was administered, with rapid disappearance of the symptoms. **Zimmer** describes bilateral metastatic cyclitis following an attack of *bubonic plague* in an Italian taken with sudden fever, a pustule in the right axilla, and loss of vision. Bacteriologic and clinical diagnoses demonstrated the plague. The eyes showed slightly increased tension, mild injection, posterior synechia, exudate in pupil, infiltrated vitreous so the fundus was not visible. Anterior chamber normal, and no visible nodes were seen. The patient was cured of the disease, but the blindness was permanent.

The 3 cases of *meningococcus irido-choroiditis* reported by **Lavergne** emphasize the necessity for watching over the

eyes during cerebrospinal meningitis, to detect ocular complications in their incipency. Lavergne insists that at the least suspicion of iridochoroiditis, ophthalmoscopic examination is imperative. The etiology of iridocyclitis has been discussed by **de Schweinitz**, with special reference to focal infections.

**SUBCHRONIC FEBRILE UVEO-PAROTITIS.**—A delicate, thin, anemic (hemoglobin about 75%) girl, aged 21, came to **Kuhlefeld** on August 20, 1915. The father died of tuberculosis, but there were no other cases in the family. Lues could be excluded in both parents and patient. Parotitis epidemica as a child. In adolescence some affection of the fourth metacarpo-phalangeal joint of the right hand. Patient was not aware of having been in contact with anyone sickening from any illness. Since July, swelling and tenderness in each parotid region. Diminution of vision in the right eye August 15; August 18 last joint of left little finger, head and eyes painful. Feels tired. Has not noticed any symptoms of fever or of weakness or disturbances of taste or sensibility. Acute laryngo-bronchitis, but no demonstrable changes suggestive of tuberculosis. Apices alike and clear. Urine free from sugar and albumin. No symptoms of sinusitis.

Preauricular portion of each parotid right retromaxillary portion nearly the size of an infant's hand, the left somewhat tender and uneven, pigeon-egg sized; surrounding parts not swollen. Nothing abnormal in mouth or throat. Sublingual, submaxillary and lacrimal glands neither tender nor swollen. No tenderness in the region of the ovaries.

Right ocular conjunctiva somewhat injected, small deposits on the lower part of Descemet's membrane, iris a little hyperemic. Media clear, papilla and retina over a wide circumpapillary area gray, turbid and swollen; blood vessels invisible at places; veins swollen and tortuous. Numerous large and smaller hemorrhages and gray patches in the inner and lower quadrant of the fundus. V. 5/10.

Left, normal condition. Last joint left little finger swollen and tender.



No demonstrable pareses. August 23. Pupil fairly well dilated by atropin, tho irregularly; iris swollen; exudation in pupil. No details of fundus visible. V. fingers 1.1 meter. Admitted to hospital. Aspirin, sweating, inunction. August 29. L. E. Pericorneal injection, some iris congestion. September 12. Left hospital. September 28. Right parotitis rather increased lately. Iritis gone. Collo-iodid and sweating. October 28. Papilla pale, papillary vessels in the main visible, surrounding retina normal in appearance, in the macular area there remain only the pigment patches, the formerly gray worm-shaped patch is white. V. fingers at 5 meters. Swelling in parotid glands markedly reduced. General conditions rather better. Collo-iodid discontinued and arsenic given.

The temperature has varied in the mornings between  $36.2^{\circ}$  and  $37.3^{\circ}$  C., and in the evenings between  $36.3^{\circ}$  and  $37.4^{\circ}$  C. There have been four definite rises of short duration, the maximum in the first being  $37.7^{\circ}$  C., in the second  $37.7^{\circ}$  C., in the third  $37.5^{\circ}$  C., and in the fourth  $37.9^{\circ}$  C. Possibly the first of these was connected with the iritis in the left eye, and the second with an exacerbation of the right-sided parotitis. The case occurred at a time when there were in the patient's neighborhood only isolated cases of epidemic parotitis. (In Helsingfors three in June, four in July, and not a single case in August were notified.) So far as is known, too, the disease was not transmitted to anyone else.

**Mackay** described a case of uveo-parotitis with *irido-cycloplegia* in a table-maid, aged 30. When first seen, March 10, 1916, she showed slight, diffuse, deep conjunctival and very moderate ciliary injection. The pupils were widely dilated (about 6 mm. in diameter) and immobile to light as well as on convergence, and tho appearing almost circular, a few posterior synechiae were found. Accommodation paralyzed. There were well marked punctate deposits on the back of both corneae, and haziness of the vitreous. Thru this fog the details of the fundus were rendered somewhat obscure, but

no gross changes were to be seen. R. V. 5/60 not improved by any lens. L. V. 6/60.

Two days after admission to hospital she developed bilateral swelling of the preauricular portions of her parotid glands. The cervical part of the parotids were less affected and no other glands in the neck were involved. The enlarged parotids were smooth, firm and only slightly painful on pressure or on yawning. Her temperature,  $98.2^{\circ}$  F. on admission, remained for the most part rather subnormal, varying from  $96.8^{\circ}$  F. in the morning to generally a degree more in the evening. The highest temperature was  $99.4^{\circ}$  F.—two days after a von Pirquet's cuti-reaction. Von Pirquet, Wassermann, and a subsequent injection of Koch's old tuberculin negative; no growth had been obtained from the blood culture; blood showed a leucocytosis; a culture from the conjunctiva showed Gram positive cocci (*staphylococcus albus* and *citreus*).

At the last examination, April 19, 1917, V=6/12 in each eye and Jaeger 1 more easily; pupils equal and almost circular, especially the left, about 5 mm. in width in subdued light, responded very little, if at all, even to brightly focused light, but definitely narrowed to about 3 mm. on convergence with accommodation. Some fine brown spots of deep punctate keratitis on both corneae, vitreous practically free from opacity; optic discs well defined, no visible choroidal changes even in the periphery of the fundus. Nothing abnormal was to be felt about the parotid glands; salivation appeared to be quite natural; the ciliary muscles had practically regained their power. On the whole she seemed in a fair way to make a complete recovery.

Mackay searched thru the *Index Medicus* from Heerfordt's communication of 1909 up to the present time, and found details of only six cases of dilated pupils and paralyzed accommodation recorded in association with parotitis. In three of these, the irido-cycloplegia appeared to be a secondary consequence of optic neuritis or optic atrophy, or as part of a third nerve

paralysis. Of the remaining three cases the first, published by Baas in 1886, had cycloplegia three weeks after mumps. Diphtheria was excluded. The second, reported by Mandonnet in 1903, was a child of 9, with complete paralysis of accommodation and of the soft palate after mumps. The third, recorded by Dopter in 1904, aged 31, two or three weeks after mumps which quickly subsided, developed pyrexia, occipital headache and double orchitis, left facial palsy, paresis of left half of tongue and soft palate, left mydriasis and left cycloplegia. He had definite leucocytosis and made a good recovery. In none of these cases was there iridocyclitis.

Mackay found no record of a case exactly reproducing either the group of symptoms or the order of their occurrence, which characterized the one under his observation. The ciliary body doubtless plays its part in endeavoring to get rid of deleterious substances circulating in the blood stream. It appears not improbable that the obstinate and tedious character which iridocyclitis so often presents is due to the fact that the morbid material passing from the ciliary gland into the aqueous fluid has no chance of being directly evacuated from the body like the saliva, but is necessarily reabsorbed into the circulation and sets out again in a vicious circle. It is commonly believed that in mumps the poison enters the parotid glands thru the buccal orifice. If that be so, it is easy to understand how the parotid gland reaction precedes other signs and symptoms of remote or metastatic inflammation or nerve pareses, which are presumably due to an extension of the poison thru the system, or are set up by toxins produced by the primary infecting agent. When remoter toxic effects precede the parotitis, the poison, whether due to mumps or not, may (or must) have entered by some portal other than Stenson's duct. The possibility of a mixed infection, e. g., with diphtheria, should not be put aside without further careful investigation.

**DIAGNOSIS OF UVEITIS.**—**Thompson** maintains that iritis is a local mani-

festation of a constitutional condition. In his experience the percentage of cases in which he could find no cause is very small indeed. If history or findings point to any focal infection in the sinuses or teeth, the patient is sent immediately to a roentgenologist for radiographic pictures. Always a Wassermann test is made, regardless of the history. When there is nasal discharge of any kind a specimen is sent to the laboratory for diagnosis; urine is always examined.

A mere cursory examination of the nasal fossae will, as **Wynn** emphasizes, often fail to reveal sinus disease that is causing the most severe focal symptoms. It must be most thorough and painstaking to be of any value, and **Wynn** found great help from the use of Dowling's tampons, which consist of a cotton tampon about 3 inches in length, soaked in argyrol 10 per cent solution, and placed in the middle meatus for about 15 to 30 minutes. If the sinus is affected there will be a free flow of muco-pus and the tampon will be discolored. In the discussion of Irons and Brown's paper, **Rochester** spoke of the great value of the suction apparatus in the diagnosis of these cases.

**Levy** calls attention to the fact that in all but one of his cases dental infection has been on the same side with the affected eye. He warns the ophthalmologist to satisfy himself that a careful roentgenographic examination has been made of all suspected teeth, before excluding them as a possible etiologic factor in infectious eye conditions.

While the complement fixation test for gonorrhea was formerly very unsatisfactory, giving positive results in only 5% of the cases, **Fredrick** says, the procedure has now been improved by the use of a great number of strains, as many as 150 in some places, so that today we can count on 85% efficiency. He gives the clinical histories of 3 cases from his practice illustrating the great aid the complement fixation test can afford one. **Darier** also attributes great importance to the complement deviation by means of the gonococcic-antigen. The authors mentioned un-



der etiology express the same views with regard to diagnostic methods.

For the differential diagnosis of incipient iritis from simple conjunctivitis, **Darier** recommends instillation of adrenalin, or better cocarenalin, after which the superficial conjunctival hyperemia will disappear if it is a simple conjunctivitis. If it is an iritis, a deep and violet hyperemia will persist around the cornea. **Woods** considers the proper attitude of ophthalmologists to the use of tuberculin for diagnostic purposes: avoidance of focal reaction in ocular lesions; and a positive von Pirquet with elimination of other causes a sufficient diagnostic sign.

**TREATMENT OF UVEITIS.**—In iritis, accompanied by violent inflammatory phenomena, radiating pains, **Darier** recommends leeches, which **Ormond** also found very useful. **Ormond** said that great comfort was obtained by the continuous application of the electric coil. From the macroscopic and microscopic findings, in his experiments on the influence of radium emanation on the deposits of urates in the eye and the peritoneum, **Wessely** concludes that radium emanation even in high concentration, exceeding the usual clinical values, has no influence on the effect and the fate of urates deposited in the body. The removal of the septic foci in cases of iritis or focal choroiditis, e. g., in the dental regions, tonsils, etc., as the only rational treatment with brilliant results, was mentioned under etiology.

Not only a method of diagnosis but also the best form of local treatment in chronic affections of the sinus, if they are not operable, is, according to **Wynn**, the use of Dowling's tampons. The benefits obtained are due to the effects of induced capillary attraction, which drains the ethmoidal cells of retained secretions and depletes the turgid soft tissues. The immediate effects produced by the tampons are conjunctival congestion, sneezing and a flow of mucopus. **Rochester** thought the suction apparatus was of great aid, when it was necessary to use conservative methods.

**Dunn** considers vaccines in the earlier stages a valuable adjunct to our list of remedies in the treatment of secondary ocular inflammations. He used Mulford's mixed influenza serobacterins, which contains killed sensitized bacteria: b. influenza, staphylococcus albus and aureus, streptococcus, pneumococcus. In no case, however, did he fail to supplement their use with such general or local treatment as he thought the case required. In a case of toxic choroiditis secondary to a chronic alveolar abscess, **Rowe** felt that stock vaccines for mixed infections, after the teeth extraction, while they were begun late, were still in a measure responsible for the happy results obtained. **Darier** regards autovaccines in gonorrheism of precious therapeutic value, and **Fredrick** reports most brilliant results in 3 cases from the injection of mixed Neisser serobacterin.

To **Lang** the treatment of tuberculous iritis, as for tubercles of the lung, appeared to be good air, graduated exercise, and food rich in fats, as well as such local measures as would subdue inflammation and prevent closure of the pupil. **Woods** avoids tuberculin as a therapeutic measure in acute cases. Under "acute" there should be included duration and advance of the lesion, as indicated by condition of the vitreous, descemetitis, etc. Tuberculin is indicated when the trouble is nonprogressive, but does not get well. A positive von Pirquet, with elimination of other causes, is sufficient basis for the use of tuberculin in therapeutic doses. The present status of vaccin therapy is so uncertain, in the opinion of even those most expert and experienced, that ophthalmologists owe it to their patients to conduct this treatment under the guidance of one trained in "immunologic problems."

**Koeppé** recommends systematic treatment of the portions of iris attacked by tuberculosis with the Nernst lamp. It deserves to be adopted by everybody aside from the specific tuberculin treatment. The best cases for the treatment with the Nernst lamp are all of the nodular forms, and the localized changes in the iris, as, also, the



cases of pure serous iritis without decided changes in the iris tissue. The technic is described and the literature on the subject is given.

**Lavergne** urges that if the diagnosis of irido-choroiditis in cerebro-spinal meningitis is positive, antimeningococcus serum should be injected immediately into the vitreous body. This is the only treatment known to date, he reiterates, that has realized unmistakable benefit. In the three cases here described it came too late to save vision in the affected eye in one child of 11 months; the second child, 13 months old, died, and the third, 5 years old, was left with much impaired vision in the affected eye. **Mann** recommends subconjunctival injections of a 1 to 2,000 solution of cyanid of mercury (20 drops), and is convinced, that in a case of virulent irido-cyclitis, with high tension and occlusion of pupil, of unknown source of infection, without these injections the eye would have been lost.

**ATROPHY OF IRIS.**—According to **Lane**, primary progressive atrophy of the iris, with almost complete loss of all the iris stroma, is a comparatively rare condition. Atrophy of a portion of the iris due to a specific or tubercular lesion, to an injury or an increased intraocular tension, is not uncommon. After careful search of the literature only twelve cases appear to have been reported. Lane's patient, a well-developed young woman of Bohemian descent, single, aged 20, has been under observation since October, 1915. Her parents, one brother and two sisters, are living and well. A brother died of tuberculosis in infancy, and two sisters have died of the same disease. Five other sisters died in infancy; the patient does not know the cause of death. The patient's general health has been good. She has had a few of the minor diseases of childhood; menstruation regular. When 13 years of age a facial acne vulgaris indurata of a very persistent type developed. The face is deeply scarred, and numerous hard indurated masses are now present. There is no history of injury. The patient is not of a nervous temperament.

Two years ago she noticed the iris of the left eye had a small black hole in the margin of the pupil, which extended downward into the colored part. Shortly afterward another hole appeared which extended toward the temporal side of the eye. At times the eye became inflamed. This would last for several weeks. There was little pain at this time, and never any secretion. Gradually other portions of the iris began to retract and disappear, until the pupil had the appearance of a rectangle. The only iris left was four small bands. The eye became more painful and the vessels injected. About one year ago the patient noticed the eyeball was smaller than the right eye. Vision was poor, at times worse than at other times. During the past months a film had gradually appeared on the cornea. The patient has been nauseated lately and during the past two weeks the pain has interfered with sleep.

A distinct glaucomatous cloudiness of the cornea exists. The ball is considerably smaller than the other one. Ciliary vessels are deeply injected. Vision: R. = 6/30; L. = fingers at six inches. Plus 2.00 cyl. ax. 90° gives 6/7 in R. Tension: R. 22, L. 56. Blood pressure, 115. Slight red reflex, but fundus cannot be made out. Good transillumination of each ball. The iris is almost completely absorbed. A small almost invisible band exists above and to the nasal side; the iris tissue at the temporal and lower quadrants is only slightly more abundant. None of the bands of iris tissue join each other at any point.

The right iris apparently normal. Tuberculin and Wassermann tests negative. The acne seems to be the only condition at all suggestive of a possible focus of infection. Dionin and physostigmin salicylat and treatment for the acne was instituted. In ten days the tension greatly improved, the cloudiness of the cornea was better. Vision: R. = 6/20. L. = 1/60. No pain or nausea.

Late in January, 1916, the tension suddenly rose and the eye became painful. A trephining operation was done. There was considerable difficulty in

dissecting the flap and bleeding was troublesome. A clean disc was removed. No iris appeared in the trephine hole, nor was it possible to draw it up into the opening with forceps. A stab opening was made and the aqueous squirted about four inches above the patient's face, so great was the intra-ocular pressure. The cornea at once became soft. An attempt was made to draw up the iris, but this was only partially successful as the iris was firmly adherent. The eye healed rapidly, the cornea losing its haziness, so the fundus could be indistinctly seen in a week following the operation, when the patient left the hospital. V.=5/60. A large bleb remained over the trephine hole and the filtration was good.

In a month the ball was larger, the cornea was practically clear, no injection of the vessels. Tension 20. November, 1916, the eye was clear, only a pin point haze over the center of the cornea remaining. The bleb was much smaller and the hole not easily made out. However, there was still some filtration. V.=3/60. The fundus could be fairly well made out, some cupping, tension 28. The patient occasionally used eserine or dionin if the eye did not feel good. This always gave relief. Absorption of the iris was still going on; less was visible than on her last visit. In December the eye was still clear, and the difference in the size of the two was not now apparent. Only a trace of iris remained above, and a faint line below and to the temporal side. In February, 1917, the patient reported with the right eye troubling for the previous two weeks. The pupil was partially dilated and somewhat sluggish. Slight conjunctival injection, left eye clear. Vision: R.=6/30, with correction =6/10 minus. L.=3/60. Patient is dizzy, nauseated, and has severe headache. No cupping of disc. The media are not perfectly clear. Tension 30. Physostigmin gave prompt relief, improvement in vision and in symptoms being rapid. The acne has not responded to treatment. Vaccines have been used. At times it is better. Various tests have not re-

vealed anything to show the cause of the disappearance of the iris.

In the reports of de Schweinitz, Harms, Wood, Zentmayer, and in this patient, increased tension has been found. No one yet has been able to show a definite primary cause for essential primary atrophy of the iris. Men and women are each subject to the condition. The period of twenty to forty has furnished the most of the cases. Previous history of injury was found in at least four of the cases, but undoubtedly could not be called a possible causal factor of great importance. Nervous tissue degeneration may be a factor, as in Dupuy-Dutemps' report of atrophy of the iris in *tabes dorsalis*. Latent tuberculosis was undoubtedly present in several of the patients of those reporting atrophy of the iris.

Autotoxemia could be a factor. The acne which this patient has had for years is probably of this origin, as diet and eliminative treatment seem to produce a slight improvement.

Lane hopes that some one may see this condition when it is beginning and make an exhaustive study. Many cases of partial atrophy of the iris, or arrested condition of loss of iris tissue, have been reported. But only a few go on to complete absorption of all the iris stroma and loss of vision. All the cases reported show more or less loss of vision. The question arises, will the other eye become involved in a similar process? As yet no report has shown this to have happened. Increased tension has been present in nearly all the patients reported. It appears that there may be some disturbance of the bodily metabolism which exerts marked action on the eye tissue, causing the increase of tension.

**ATROPHY OF CHOROID.**—**Chance** exhibited a case of extensive atrophy of the *choroid* in a man of about 70, who has been in good health. Wassermann negative. There has been nothing in his business that would give rise to such atrophy. Here and there, large surfaces of the sclera are seen. There is but little secondary pigmentation. The macular region is intact. V.=6/30.

The appearances in **Jackson's** case supported the view of Stock and others that a large part of cases of choroidal atrophy are due to tuberculosis.

**OSSIFICATION OF THE CHOROID.**—**Monbron** reports a series of 5 cases with histoanatomic examination of the

specimens, and a general review of the subject with a bibliography. He concludes contrary to the opinion generally received that only the choroid and more exactly the choriocapillaris is the starting point for intraocular ossification.

## SYMPATHETIC DISEASES

HANS BARKAN, M. D.

SAN FRANCISCO.

A review of the literature relating to sympathetic diseases of the eye appearing during 1917 and to February 1st, 1918. Allied topics are reviewed in the section on the Uveal Tract, or will be taken up in the section on Injuries.

**OCULAR ANAPHYLAXIS.**—**Woods** refers to the mycotic theory, as to the pathogenesis of sympathetic ophthalmia, advocated by Roemer and Fuchs, to the cytotoxic theory of Golowin; and to the theory of Elschmig, who assumed sympathetic ophthalmia to be an anaphylactic uveitis. In order to determine the fundamental points of the anaphylactic theory, the author endeavored to test the following: 1. The antigenic properties of homologous uvea-organ specificity. 2. The ability of one eye to react to perfusion in animals previously sensitized by intraocular injection of the other eye. 3. What constituent of the uveal tract is responsible for such antigenic properties as are possessed by homologous uvea.

The technic of his experiments is given, and a summary of his results. He concludes as follows: 1. Homologous uvea has the power of acting as antigen, and producing an ocular hypersensitiveness. 2. Homologous uvea possesses a strong specificity. 3. Intraocular injection of a small amount of either homologous or heterologous uveal emulsion can produce a hypersensitiveness in the second eye. 4. From the evidence at hand, it seems probable that the peculiar antigen properties of uveal emulsion are due to the pigment epithelium. A bibliography is added.

The anaphylactic theory of sympathetic ophthalmia has also been fully

discussed by **Schieck**, who questions whether the theory propounded by Elschmig is at all clinically applicable, or meets with important objections, so that it must be repudiated. Elschmig advanced the hypothesis, that sympathetic ophthalmia is an expression of local anaphylaxis, utilizing Bail's theory. Bail's theory says that by antigenous resorption of injured uveal tissue an over-sensitiveness is produced in the organism, especially the homologous organ, viz., the second eye.

As in von Pirquet's experiments inflammations occur in consequence of increased capability of reaction through introduction of the anaphylactogen from outside, in our case an inflammation would have to arise, with the serious sequelae due to the vulnerability of the organ, by the least disturbance in the over-sensitive eye, by the disintegration of even one uveal cell or pigment epithelium.

Schieck points out, that for applying this assumption to the clinical facts it must be proven: 1. That the uvea contains an organ-specific, anaphylactogenous albumin, which is absorbed as antigen; 2, whether an organism produces antibodies against its own, although serum-heterogenous, albumin, and whether it can be sensitized against its own products, in other words, whether an autoanaphylaxis exists; 3, how a spontaneous disintegration of uveal cells occurs in the second eye and



how the introduction of the anaphylactogen takes place locally; 4, the main point is that the clinical facts must be brought in accord with the essence of anaphylaxis.

Leaving the first three points aside, Schieck considers the course and peculiarities of the disease as such and whether they fit into the established scheme of anaphylaxis. He emphasizes that the protective effect of enucleation has not been sufficiently considered in judging the validity of the anaphylactic theory. Zade showed experimentally that the anaphylactogen from the eye after injection of the antigen into the anterior chamber is communicated to the whole organism after three hours. Perhaps the sensibilization of the body occurs even earlier. What good, then, Schieck asks, can removal of the injured eye do, if in the meantime uveal pigment, in a form acting as antigen, has entered the circulation, and the process of sensibilization takes place outside of the eye in the vascular system or the bone marrow, and, at the latest 14 days afterwards, the organism contains the dreaded anaphylactogenous antibodies against uveal pigment, and the least anomaly in the other eye may elicit the reactive process? If sympathetic ophthalmia were a process of anaphylactic reaction, all our prophylaxis would be in vain and the other eye even after preventive enucleation of the injured eye would be endangered for weeks, occasionally for years or for the whole life. Since fortunately this is not the case, sympathetic ophthalmia can have nothing to do with a sensibilization against uveal pigment, and the theory must fall. The certain protective effect of enucleation is not conceivable if the anaphylactic theory is accepted. In that respect bilateral idiopathic iritis and parenchymatous keratitis, which as a rule also occurs in both eyes, are generally entirely different from sympathetic ophthalmia.

**PATHOGENESIS OF SYMPATHETIC OPHTHALMITIS.**—**Van Schevensteen** refers again to the early theory of sympathetic ophthalmia by noting in several cases an early papilloretinitis with fine vitreous opacities, and he has seen these

repeatedly when the sympathizing eye has been observed carefully during the entire course of the affection of the originally injured one.

While all investigators agree that the typical anatomic picture as described by Fuchs is pathognomonic of sympathetic ophthalmia, **Morax** has gone even further and in a very careful pathologic study, in which he was assisted by Landolt, shows that this process takes place in a different fashion, according as to whether the wound of entry is in the anterior portion of the ball (especially in the region of the ciliary body), or as to whether the inciting foreign body or injury is located in the posterior part of the ball. The sympathetic ophthalmia set up by the latter injury he considers a great rarity. The lesions caused by either one of these two localizations as regards injury are nodular infiltrations of the choroid and of the subchoroidal space by lymphocytes. They vary, however, in that those caused by anterior trauma, are inclined to give rise to greater infiltration in the deep ciliary layers; whereas those in the posterior part cause a rather marked infiltration about the entrance of the optic nerve.

**CLINICAL REPORTS.**—**Brown** reports an unusual case of sympathetic inflammation developing in the fellow eye in the eleventh week, in which the picture (noted a few times before), of depigmentation of the cilia of all four lids was quite marked. This might be ascribed to a pigment antigen. Section of the primary eye showed typical findings.

In two cases reported by **Russ Wood** injections of old tuberculin were given and were followed in each case by a marked focal reaction in the sympathizing eye. But no such reaction occurred in the primarily injured or exciting eye. In neither case was the use of the tuberculin followed by any apparent benefit. In both cases injections of salvarsan had been used without benefit, and after the tuberculin injections steady deterioration of vision continued. This author suggests the possibility that sympathetic ophthalmitis may be due to symbiosis, there

being a cooperation between the tubercle bacillus and some unknown protozoan.

**Darling** reports two clinical cases of sympathetic ophthalmia. In the first, while examination and history were significant, there was on anatomic examination, no sign of typical sympathetic disease, but a degenerated eyeball with bone formation. The second case is remarkable by the fact that there was at no time a keratitis punctata of the sympathizing eye, although in every other respect it showed the classical picture.

**PROPHYLAXIS.**—Prevention, and the reasons why sympathetic ophthalmia is relatively rare in the present war, in spite of many ocular injuries, have been extensively discussed by **Weekers** who, in upward of 800 eye injuries, has not met with a single case, and he contrasts this state of affairs with that of former wars, where the disease was common. In order to show the danger in times of peace, he points to the statistics of **Ohleman** who found sympathetic ophthalmitis in 0.7 per cent.; **Knies**, 3 per cent. in wounds of the eye; and **Hobby**, 11.6 per cent.; after removal of cataract. **Everbusch** had 1.3 per cent; **Agnew** 2 per cent; and **Steffan** no less than 21 per cent.

**Dimmer** also comments on the rarity of sympathetic ophthalmia following war injuries, and thinks the difference between the percentage and that seen in times of peace is worthy of investigation.

In order to prevent its occurrence, **Weekers** urges waiting for at least a few days before enucleation whenever the wound is such as to allow of the hope that the eyeball will keep its shape. He maintains, however, that the classical dictum of removing the eye if it remains painful and irritable for a month or six weeks after the injury should be followed, and not even to wait as long as this if the globe appears to be on the way to atrophy, or if exudative iridocyclitis develops in the injured eye. He is inclined to ascribe the rarity of sympathetic ophthalmia nowadays to the asepsis and antisepsis which are now so general, adding that

when operators will take as many precautions before opening an eye as for a laparotomy, postoperative sympathetic ophthalmia will very nearly disappear.

As is quite natural, in these times of attention to treatment, there is not as much time to devote to questions of etiology. A great deal has been written on treatment of cases of sympathetic ophthalmia. **Weekers** maintains that the early removal of the wounded eye, even though lost as to function, is not justified as a prophylactic measure against sympathetic ophthalmia. There is no urgency for such removal for several days, especially as the danger of sympathetic disease seems to be diminishing; he urges temporizing, as delay may enable us to save eyes that at first sight seem doomed to enucleation.

When radical operation on the wounded eye is necessary, **Weekers** gives the preference to evisceration, believing it to be as good a guarantee as enucleation in regard to the development of disease in the second eye, and for it he claims far superior results as regards prothesis. This view is not shared by **Orlow**, who maintains that neither one nor the other is an absolute preventive, and that of the two enucleation is decidedly the more so. He has seen some cases develop in spite of these procedures, and advises caution as regards the definite statement to the injured man that the second eye will surely be saved by these operations.

**Verwey** has written a most interesting paper on the conservative treatment of an injured eye suspected of possibly becoming the exciting agent of a sympathetic ophthalmia. He excises whatever may have prolapsed thru the wound of entry, dissects the conjunctiva off the limbus, and performs a tobacco pouch suture, a proceeding which is simple and effective. The patients generally do not have to lie down and the injured eye stays fairly tranquil. He believes that this procedure does not militate against any sight which the eye otherwise might have kept if the procedure had not been adopted. He has performed it in eight



cases of lacerations of the cornea; four cases of lacerations of the sclera; and in twelve cases of combined lacerations. A fair degree of vision was maintained in seven of the above. In one case the cornea and sclera had been widely lacerated, almost the entire iris had prolapsed, including the ciliary body, vitreous and lens. These were excised, and a tobacco-pouch suture applied to the conjunctiva. Twenty-four hours afterward, the uninjured eye showed slight iritis, which was controlled with atropin. He has enucleated the injured eye in a number of cases about 32 days after the accident, when the iritis of the second eye was just commencing and was well controlled with atropin and the administration of sublimat by mouth. In all these cases the sympathizing eye recovered very promptly.

**TREATMENT OF SYMPATHETIC OPHTHALMITIS.**—**Brown** has noticed a marked improvement in the course of the sympathizing eye with the use of mercury and benzosalin, combined with a tuberculin course. This improvement, however, was not very rapid until the infected tonsils in the case were removed, when vision cleared up to 4/10 and has remained this acute for 14 months. **Darling** also has seen improvement of the sympathizing eye follow almost immediately after removal of the tonsils, although in his case the vision fell again five days later to 20/200.

Wilder, in discussion of Brown's paper, maintains that operation in cases of increased tension in the course of sympathetic ophthalmia is something that should be refrained from if at all possible. He thinks it is a point which is well worth considering in connection with any case of sympathetic ophthalmia in any stage, for the reason that the inexperienced ophthalmologist, who had not seen a number of these cases through long periods of time, might easily be tempted too early to operative interference. If there is any one thing in connection with the treatment of these important cases which should be emphasized, it is to absolutely refrain from operative interference even

months and months after the subsidence of the last symptom. He thinks the most that might be done would be paracentesis, which might be accomplished with safety; but if there is anything brought home to him in the treatment of this disease, it is that one should not jump in "where angels fear to tread." He is convinced that no operation should be attempted for restoration of the vision until two or three years after the subsidence of all symptoms.

**SYMPATHETIC DISEASES OTHER THAN OPHTHALMITIS.**—The terminology "sympathetic irritation," "sympathetic amblyopia" and "sympathetic ophthalmitis" is, according to **Cousin**, one which should be adhered to strictly, and which has in each instance a definite reason for existence. He believes that there exists a group of signs, which cannot be accurately described as sympathetic ophthalmitis, but which should be carefully differentiated from sympathetic irritation. He terms this group that of "sympathetic reaction," and claims that it occurs every frequently among the wounded of the French Army.

In the wounded eye the symptoms are pain, tenderness on pressure, lacrimation, conjunctival injection. Photophobia is a less constant symptom. These symptoms date usually from the time of the injury, which in most cases is a perforating wound, and persist after cicatrization is complete. The pain is usually persistent, although not severe, and is occasionally liable to short exacerbations. Pain and tenderness have never been absent from the cases under the author's observation. Lacrimation and conjunctival injection vary greatly in degree.

In the unwounded eye, the symptoms present considerable resemblance to those already described, but are, as a rule, less marked. Their onset is later; in some instances 36 to 48 hours, but more commonly seven to ten days after the injury. The writer mentions four symptoms as characteristic: photophobia, lacrimation, discomfort in reading, slight lowering of visual acuity. Photophobia is the most frequent symptom, and is usually well-marked.



but relieved by the use of tinted glasses. Lacrimation is of very variable intensity. Discomfort induced by reading, or by any occupation requiring accurate and prolonged use of the eye, is often the symptom which leads the patient to seek advice.

The loss in visual acuity, always slight, is difficult to estimate accurately; in most cases no record of the vision before the accident is obtainable. Cousin states that he has found a reduction in acuity varying from 1/10 to 5/10. Ophthalmoscopic signs are negative; pain is absent. These symptoms, while resistant to ameliorative treatment, all disappear shortly after removal of the wounded eye; the defect in vision being the most tardy. Enucleation of the wounded eye is the treatment recommended. Notes of eight cases are included in the paper.

**Shoemaker** and **Alt** report a case which can very well be referred to in relation to the type of cases described above by Cousin. The diagnosis of sympathetic ophthalmia was made, the injured eye having lost the sight 13 years before, after injury with a pair of scissors. While the blind eye was not giving any discomfort, the wound on

the limbus and the sympathizing eye had shown for the last four days a severe neuro-retinitis, with a few small exudates in the retina and minute hemorrhages. The positive diagnosis of sympathetic ophthalmia did not seem justified, especially as Sluder reported a left hyperplastic and a right purulent sphenoiditis. It was agreed, however, as the injured eye was blind, to remove the same. Mercurial inunctions were continued, but though there was marked improvement, the neuro-retinitis persisted. The examination of the removed eye showed simply the results of a severe infectious inflammatory process following the original injury. The peculiar signs given by Fuchs as characteristic of sympathetic ophthalmia were altogether wanting.

In this case, as undoubtedly in many seen in practice in which the diagnosis of sympathetic ophthalmia is made, the chances are that the case is much more likely to fall into the classification described by Cousin as sympathetic reaction, and more of the enucleated eyes examined in the laboratory would show a freedom from the specific changes described by Fuchs.

### GLAUCOMA.

JOHN ALEXANDER McCaw, M. D., Oph. D.

DENVER, COLO.

A digest of the literature relating to intraocular tension and glaucoma for the year 1917 and until March 1st, 1918. Some related subjects will be found mentioned under Diagnosis and Injuries.

**ANATOMY OF THE FILTRATION CHANNELS.**—**Maggiore** concludes that the canal of Schlemm in man is a vascular structure; that the canal is joined to a closed vascular plexus formed of numerous veins with a few arterial twigs. The connections between that plexus and the canal are formed by a small number of collecting trunks, about 20 or 30 in number, with very small lumens. He found that there was no connection between the canal and the anterior chamber, and that the canal had a complete endothelial lining. Under normal conditions the canal contains only lymph.

**PHYSIOLOGY.**—**Magitot's** work on physiologic intraocular pressure concludes as follows: That, (1) the normal intraocular pressure in man oscillates between 15 mm. and 25 mm. Hg.; (2) the pressure varies along with arterial pressure; (3) the factors influencing pressure are the general and local blood circulation, and the walls of the eye; (4) the eyeball is distensible in the adult due to elastic fibers in the sclera; (5) the uveal tract is an erectile tissue, a blood reservoir, which regulates the pressure; (6) the variations of pressure within the normal limits are due chiefly to variations

in the general arterial pressure; (7) variations of the general blood pressure are accompanied by more decided hypotensions than hypertensions; (8) the pressure is more subject to variations of the local circulation than to those of the general circulation; (9) among ocular nerves, the cervical sympathetic or its ganglia are alone capable of influencing the pressure of the eye.

The sympathetic centers capable of altering pressure are: (a) Bulbo-medullary, action dilation; (b) cervical and cephalic, mostly constriction; (c) the ocular, action variable. The last is the real regulating organ. The aqueous has no influence on pressure except in conditions which lead to rapid secretion of the aqueous, when albuminous substances make their appearance and alter the pressure. If collyria have any influence on the pressure of the normal eye, they have it through the action of these drugs on the diameter of the vessels of the uveal tract. The intraocular pressure is solely under the influence of the ocular vessels, and these vessels are regulated by their nerves.

The uncompleted studies of **Priestley Smith**, upon the blood pressure in the eye and its relation to the chamber pressure, have, so far as yet published, dealt only with the mechanical factors that influence blood pressure in general, by a discussion of the relation of main trunks to capillaries in the blood stream as a whole.

**HYPOTONY.**—**Collins** classifies the sequels of hypotony. 1. Those due to relaxation of tissues usually kept taut: (a) wrinkling of the anterior lamina of the cornea; (b) wrinkling of posterior lamina of cornea and the layers of the substantia propria immediately adjacent to it; (c) thickening of the sclerotic coat; (d) wrinkling of the elastic lamina of the choroid, and the heaping up of the pigment epithelium on its inner surface where the folds are deep; and (e) the displacement forward of the lens and slackening of the suspensory ligament, both of which tend to increase the refraction of the eye. 2. Those due to production of relatively higher blood pressure compared to intraocular pressure that ex-

ists under normal conditions: (a) In the choroidal veins, the normal excretion of lymph through them is arrested and instead, an exudation of lymph takes place, giving rise to detachment of the ciliary body and choroid; (b) in the veins of the iris, the normal excretion of the aqueous humor thru them is arrested, and instead, an exudation of lymph into the anterior chamber takes place; (c) in the capillary vessels of the ciliary body, the secreting function of that structure is quickened, and an exudation of lymph takes place, the albuminous constituents of which raise vesicles in the epithelial lining of the parts; (d) in the capillary vessels of the choroid, the normal exudation of the lymph is stimulated, which if it permeates the pigment epithelium may collect beneath the retina, causing detachment; (e) in the retinal vessels of the optic disc, the normal excretion of fluid from the vitreous is arrested, and an exudate of lymph into the disc takes place, giving rise to the appearance of choked disc.

**Elliott**, in discussion, pointed out that a condition of hypotony might exist for years in patients who had undergone sclero-corneal trephining, without any evidence that the eyes had suffered thereby. He had been able to keep in touch with cases for six years, and was able to say it did not necessarily cause opacities of the lens, and it was a question whether it ever did. He agreed as to the transitory tendency towards myopia after trephining. He had seen as much as 2.50 diopters of myopia within two weeks of the procedure. As the flap consolidated, the chamber deepened, the lens receded, and the myopia disappeared.

**Van Hoorn** in studying the influence of miotics and mydriatics on intraocular pressure, finds that after use of pilocarpin, there is slight hypotony, a very slight rise after the use of eserine, homatropin, scopolamin and atropin. Then tension is greatly increased after instilling a solution of 5 parts of cocaine to the 100 parts and 2 parts to the 100 of holocain or alypin.

*(Continued next month)*

# DIGEST OF THE LITERATURE.

## GLAUCOMA.

JOHN ALEXANDER McCaw, M. D., Oph. D.

DENVER, COLO.

*(Continued from April issue)*

**Gunnufson** found tension during sleep was always materially lowered. Three factors come into play for this reduction of tension: The reduction of blood pressure; miosis during sleep, marked in children, and decrease of secretion.

**TONOMETRY.**—**Jackson** says the tonometer of Schiötz measures the depth of an indentation of the eyeball, produced by a given weight applied to the center of the cornea through a steel rod. The depth of the indentation made by the rod varies with the intraocular pressure, and with the curvature, rigidity and thickness of the cornea. When the corneal plate or base of the tonometer is flatter than the cornea, or when the corneal radius of curvature is greater than the radius of curvature of the tonometer base, you get a reading that may vary materially from that indicative of the real intraocular pressure. This variation may amount to from 5 mm. to 12 mm. of mercury. Jackson used the ophthalmometer to measure the radius of corneal curvature, to show the degree of corneal asymmetry and the presence of irregularities of the surface in a series of eyes. In the 2,000 eyes tabulated, the difference in radius of curvature in the two principal meridians amounted in some cases to more than 2 mm. It will be a step toward the solution of important clinical problems if we frankly admit that the significance of increased hardness of the eyeball, whether perceived by fingers or tonometer, is still very imperfectly understood.

The most important limitation on the practical value of the tonometer, however, is that it gives readings from

which high intraocular tension and glaucoma would be inferred, when the disease glaucoma, or any special tendency to it, is entirely absent, as the rise of tension following discission of a crystalline lens or rise following operation for secondary cataract.

**HYDROPTHALMOS.**—**Becker** reviewed the literature on the etiology of buphthalmos and concluded that the condition was due to a developmental defect. He reported a case in a girl five and a half years of age. The special feature in the case was that the hydrophthalmos was unilateral. Vision, R. and L., hand movements at two feet. The patient was normal physically and mentally. The family history was negative. The patient was delivered with forceps after prolonged labor, one blade being over the root of the nose, the left eye and left frontal region. This procedure did not produce any apparent injury to the globe. At birth the left eye appeared larger than the right, and gradual enlargement has since taken place, so that the cornea measures 18 to 19 mm. The pupil is 8 mm., and irresponsive to light. Centrally, the cornea is quite thick, with good curvature, but is thinned towards the limbus. There is no equatorial or posterior staphyloma. The zonule of Zinn is elongated. The iris is moderately thinned and tremulous. The media are clear, the disc is oval 6 by 8 mm. The optic disc shows advanced atrophy. Reber and Heckel were in agreement with the author in the theory of causation.

**Risley** presented a girl of seven years with photophobia and lacrimation in the left eye. The right eye was normal. The tension in the left eye was



57 mm. The sclera was distended, with engorgement of anterior ciliary vessels. There was no pain nor headache. The condition had come on within three weeks. There was a dendritic break in the epithelium and a descemetitis. The ophthalmoscope showed a deep glaucomatous cup and a choroidal disturbance, increasing in severity at the periphery of the field. Two days later, the photophobia had disappeared, the epithelial break was diminished, while above it, there appeared striae in Descemet's membrane. The ciliary engorgement improved and the tension dropped to normal.

**Ellett's** case was that of a three months' old negro baby. The corneas were hazy and enlarged. The eyeballs appeared to be larger than normal. The tension after operation was R., 40 mm., L. 100 mm. (McLean). Stanford operated on the left eye three weeks after the operation on the right eye. Five months afterwards, the child was placed on mercurial inunctions. The eyegrounds are now visible. No cupping of the discs. The tension is normal to fingers. Apparently the disease has made no progress in eight months.

**Weeks** presented an eye with buphthalmos, removed from a child of four months. The eye had enlarged as a result of complete annular posterior synechia and secondary glaucoma. The tension was increased. Intrauterine inflammation was regarded as the cause of the condition. The right eye in **Zentmayer's** case was soft and blind. The left eye could see shadows, and the tension was very hard. He considers the hypotension of the right eye was due to rupture of the sclera from a blow. Injections of tuberculin and phylacogen in **Ziegler's** case gave improvement.

**Claiborne** trephined the left eye in a child 12 years of age with buphthalmos. Following the operation, the tension was reduced, and the eyeball became much smaller. But following this, there was a gradual softening and shrinkage of the eye. The right eye was very much enlarged, with great increase of tension, but with some vision.

Schirmer advised repeated anterior sclerotomies. Weeks suggested trying anterior sclerotomy first, and if that failed, to trephine. He also advised the removal of the left eye. Weidler advised removal of the left eye as preventive of sympathetic ophthalmia in the right eye.

**Virden** showed a case of buphthalmos in a child 15 months old. He had first seen the child when it was a month old. At this time, the eyes were so large that the lids could not be closed. When the child was five weeks old, Virden trephined the right eye posterior to the ciliary body. This operation was done on the left eye when the child was twelve weeks old. Both eyes were reduced in size, the tension became normal, and the child could see objects. At the time of operation, there was no clear cornea, it was impossible to tell where sclera and cornea began. Virden advised in these cases that all trephining should be back of the ciliary body. Schirmer said that the vitreous chamber should never be opened when it could be avoided, on account of infection and degeneration of the vitreous. Wheeler remarked that scleral trephining had been abandoned in these cases, because the tension did not remain reduced.

**Seefelder**, after study of a recent case, thinks that the enlargement of both eyes in hydrophthalmos may be due, not to a process of stretching, but to an abnormal degree of growth.

**Grimsdale's** patient was 14 years of age. She had always had large eyes and defective vision. Her vision was fingers with difficulty. There is a deep cupping of the optic disc in both eyes. The retinal arteries are larger than the veins and are tortuous. They have a broad light streak and appear to be flattened. The veins are normal. The condition of the arteries is somewhat similar to that of the cases of retinal angioma, but he has not found any mass to which the vessels run. He regards the case as allied to cases of angiomata.

**ETIOLOGY.**—**Koeppé** examined 50 cases of glaucoma with the Gullstrand lamp of high magnifying power. In 40

of these cases, he found more or less complete destruction of the pigment epithelium. He advances, therefore, a theory of the etiology of acute glaucoma. In consequence of trophic disturbance or a congenital weakness, a slow but irresistible morphological and a biologic cell destruction begins in the hitherto intact pigment epithelium, as well as in its derivatives in the iris and in part in the ciliary body. Free pigment globules and dust which has undergone a certain chemical change, and therefore become toxic, may possibly occlude the lymph passages and spaces, particularly the perivascular ones of the iris, chiefly at their openings. Also, this may lead perhaps to a contraction and gradual obliteration of the lumen and walls, with the result that the stroma of the iris is affected by a slowly advancing atrophy. This is brought about by a gradual decompensation of the circulation of the lymph, lymphatic engorgement, and the picture of lymphatic glaucoma. Through involvement of the walls of the smallest capillaries and veins, this may develop into hemostatic glaucoma. If the blood pressure is increased suddenly through the sympathetic, the result is an acute attack of glaucoma.

**Weeks** reported three cases of acute glaucoma associated with herpes zoster frontalis. The glaucoma developed two weeks after the onset of the herpes. The vision was reduced. The hypertension in all three cases was in the eye on the same side as the herpes. The explanation of the hypertension might be found in an abnormal amount of fibrin contained in the aqueous, thus leading to a blocking of the spaces of Fontana. The cases had shown no previous symptoms of glaucoma.

**Thomas** includes focal infection, syphilis and hydrophilic colloids in the etiology of glaucoma. **Hawley** considers that the absorption from the lower bowel of suboxidized products plays an important role in the causation of glaucoma. These toxic materials affect the outgoing canal, causing slight inflammatory conditions, which lessen their caliber, thus producing an imbalance between the inflow and out-

flow of the secretions of the eye. If cyclitis can be produced by these poisons, why not glaucoma?

**Vaughan** studied 20 cases of glaucoma during a period of two years. He concluded that the theory that hypertension alters with blood pressure is not proven. **Risley** reported the case of a woman 71 years of age, with high glaucomatous tension, whose hyperopic refraction passed into myopia, while under treatment, with the disappearance of the increased tension and pain. There was a uniform thinning of the sclera in the anterior segment of the eyeball, and a presumed increase in the anterior-posterior axis. **Morax** reports five cases of glaucoma caused by foreign bodies. The presence of the foreign body may or may not be recognized. **Menacho** in two cases of glaucoma, which came on in six hours following a discission operation for secondary cataract, after excluding all other possible causes, concludes that the nervous shock of the operation disturbed the balance of the circulation of the endocular lymph. Hypertension is the manifestation of this disturbance, whether there is a chemical modification of the lymph, or a mechanical obstacle to its evacuation.

**Schwenk** had a case of secondary glaucoma caused by a hyperreactive cataract. **Dernehl** gives an excellent review of the literature on the etiology of glaucoma. **Hamilton** used a few drops of 5% cocain in the eyes of a man 61 years of age. The pupils were active and the tension and fields were normal. Blood pressure, 180 mm. The vessels were sclerotic. The vision with correction was normal. Acute glaucoma followed the use of the drops within a few hours. **Levitt**, by the use of one drop of 1% homatropin in a myopic eye with minus one tension, produced acute glaucoma. **Hughes** believes that holacain caused acute glaucoma in his patient. He used two drops of a 1% solution of holocain in an eye that he had treated during a period of years for glaucoma simplex, with the result of an attack of acute inflammatory glaucoma within a few hours. **Zimmerman's** review of the literature



on the pathology of glaucoma is a most excellent article. **Kusama** writes on adrenalin in the blood of patients suffering from primary glaucoma.

**SYMPTOMATOLOGY.**—**Fischer** applies the physical theory of diffraction to account for the haloes of glaucoma. The arrangement of colors in these rings is the reverse of that in the rainbow. He gives the mathematic demonstration to show how this arrangement of colors arises by the admission of light through small openings of  $\frac{1}{2}$  to 2 wave-lengths width. Experimentally the best haloes are obtained through gratings or rulings on glass of 20,000 to 40,000 per inch. It is important also that the opacity should all be in one plane. Attempts to reproduce the glaucoma haloes by bolting silk placed on the cornea, failed because of the coarseness of its fibers. A layer of lycopodium powder of a certain degree of thinness was more successful. But the haloes obtained were only suggestive of those seen through the fine ruled grating.

**GLAUCOMA SIMPLEX.**—**Gradle** after study of his case and a review of the literature of glaucoma simplex, arrives at the conclusion that the cases now classed as glaucoma simplex without perceptible rise in tension, belong to a disease *sui generis*, that is neither a true glaucoma nor a true uveitis. The disease begins as a low grade neuritis, limited to the anterior and vessel-bearing portions of the optic nerve, and leading to an absorption of the nerve fibers that produce the caverns described by Schnabel. The intermittent rises in tension are probably due to hypersecretion, which in turn might be caused by the low-grade chronic uveitis, produced by the action of toxins from the breaking down of the nerve tissue.

**SECONDARY GLAUCOMA.**—**Posey** reports a case of secondary glaucoma with large staphyloma of the cornea, following perforating ulcer, the result of granular conjunctivitis in a girl who had been under his care since childhood. He proposed to flatten the apex of the staphyloma with caustics.

**Koyanagi** reports the case of a shrunken lens dislocated into the anterior chamber and attached to the iris by its posterior aspect and to the cornea. He thinks that the luxation of the lens within the anterior chamber caused irritation of the iris and the ciliary body, followed by adherence of the iris and the glaucoma.

**NONOPERATIVE TREATMENT.**—**Grönholm** made 33 injections of sodium citrate in two cases of acute inflammatory glaucoma, two cases of chronic and two cases of absolute glaucoma. In the cases of acute glaucoma, there was a return to normal tension for a brief period. He thinks this method of treatment combined with miotics might be effectual, but it does not compare with operative procedure. **Thomas** follows the alkaline method of treatment. He gives sodium carbonate, 7 grs. and sodium chloride, 5 grs., t. i. d. in a glass of orangeade, and the sodium citrate locally. Also, two tablepoonsful of sodium bicarbonate in two quarts of hot water per rectum, morning and evening. In other cases, he uses the Fischer solution by the Murphy drip method. **Hawley** employs irrigation of the lower bowel in his glaucoma cases.

**Jackson** has used pilocarpin for ten years in the eye of a man 90 years old, with preservation of his vision and control of the tension in glaucoma simplex. **Bane, Walker** and **Thompson** also use pilocarpin in these cases. **Carr** reported two cases of acute inflammatory glaucoma, one of which was complicated with lues, relieved and the tension controlled by eserine. **Bradburne** would first try medical treatment in chronic glaucoma, and if that failed, he would operate. He depends on massage following the operation to keep the tension reduced.

**Sansum** reports his results in two cases of acute glaucoma in which he employed therapeutic dehydration to lower the tension. After the first graded intravenous injection of glucose the tension fell from 60.5 mm. to 26 mm. Eight days later, a second injection was given and the tension fell from 54 mm. to 18 mm. A third injection was made



seven days after the second one, and the tension fell from 66.75 mm. to 37.75 mm. Within 30 minutes, the tension fell to normal when an iridectomy was done. The second case was given one injection of glucose. The tension fell from 60 mm. to 20 mm., and then an iridectomy was performed. When this patient left the hospital, eserine and dionin were given to use locally. Six months later, the tension was 35 mm.

**Barkan** gives his conclusions on present methods of treatment as follows: (1) In one-eyed patients, no fistulating operation except in last resort. (2) In acute inflammatory glaucoma, miotics, then iridectomy, preceded by posterior sclerotomy. (3) In subacute or chronic glaucoma, iridectomy or trephining; the former, should the eye be relatively good; the latter if it is otherwise. (4) In glaucoma simplex while in statu quo, use miotics. Trephine if they fail.

**OPERATIONS.**—**Hill** gives a resumé of the surgery of glaucoma from the von Graefe iridectomy to the fistulating operations of the present. The subject is presented in clear and concise language.

**POST-CILIARY TREPHINING.**—**Ewing** used this method in two cases of glaucoma. The wounds were located between the superior and external rectus muscles beneath an 8 mm. conjunctival flap raised from below. The first wound was placed 7 mm. from the sclero-corneal margin, and the second one was 9 mm. from the corneal margin. The Elliot manipulation was the one chosen. The operation was successful in both cases. The objections to the operation are insufficient drainage, and liability to choroiditis.

**IRIDOTASIS.**—**Odeneal's** patient was a colored man 70 years of age. There was absolute blindness in both eyes of several years' duration. The tension in both eyes was 120 mm. (Gradle). An Elliot trephine operation was performed on the right eye. The tension fell to 40 mm. A month later, iridotaxis was done on the left eye, and the tension fell to 40 mm. After 18 months the tension in the right eye has increased to 90 mm., but no increase in

the left. The surgical procedure was undertaken on account of severe headaches.

**Harrower** (Y. B., vol. 12, p. 163) performed iridotaxis with uniformly good results in 23 cases. **Roy** reports a case of late infection following iridotaxis, five years after the operation.

**LA GRANGE OPERATION.**—**Ellett** states the advantages of this operation: 1. Technic is similar to that of cataract extraction. 2. The conjunctival covering of the wound is not thinned. 3. A broad iridectomy is easily secured.

**SCLERECTO-IRIDECTOMY.**—Having arranged a speculum and fixed the eye with Graefe forceps, **Cilleruelo** dissects with scissors a conjunctival flap superiorly, which is turned forwards and a section made with a keratome 1 mm. from the limbus, penetrating into the anterior chamber. An iridectomy is then performed. The inferior lip of the scleral wound is raised with dissection forceps and a narrow piece of the sclerotic is extirpated by punch forceps. The same procedure is followed on the upper lip of the scleral wound, thereby making a fistula similar to that of the Elliot operation. The flap is replaced, and the operation is finished. **Cilleruelo** pointed out that the principles of the La Grange operation underlie that of Ruiz.

**THE ELLIOT OPERATION.**—**MacCallan** reports that in Egypt the Elliot trephine operation with iridectomy had almost entirely superseded the classical iridectomy. Late infection occurred in one case of 911 operations. Glaucoma was found to be the cause of blindness in nine per cent of all eyes examined. The total number of eyes examined was 11,955 in the course of a year. MacCallan performs a prophylactic operation on the unaffected eye when glaucoma attacks the other one, because of the frequency of glaucoma among the Egyptians.

**Clegg's** results in 259 cases of acute, subacute, and simple chronic glaucoma, in which he used the trephine operation, were improved 70, 47, and 32 per cent, respectively. Stationary, 25,

42, and 48 per cent, respectively; worse, 5, 11, and 20 per cent.

**Kirkpatrick** for the year 1916 reported 133 eyes that were trephined. Seventeen of these were blind and painful, and the operation was successful in lowering tension and relieving pain in fourteen. Eighty-eight trephinations were done on eyes whose vision varied from light perception to 6/6. Twenty-five of these had their vision improved and tension lowered; fifty-five of these had the tension lowered, but the vision was unaltered, and in the remaining eight, the vision was not so good as before the operation.

**Sobhy** trephined twice in the same eye for absolute glaucoma, and failed to relieve tension. The cause of failure in both operations was anterior subluxation of the lens, and the presentation of its equator in the trephine hole and faulty dissection of the flap. In both operations, the hole was too corneal. Esmet, in discussion, pointed out that blunt dissection of the flap prevents readhesion of the conjunctiva to the sclerotic beneath.

**Bradburne** makes a small buttonhole iridectomy about 3 mm., and follows with gentle massage. **Parker** believes that if fifty per cent of the selected cases of simple glaucoma can be relieved by iridectomy and fifty per cent of the remaining cases by trephining, the results of seventy-five per cent good would be better than most operations have been able to obtain. **Schoute** and **Waardenburg** in glaucoma with contracted fields, prefer the trephine operation to any other.

**LATE INFECTION.**—**Feingold** reports two cases of late infection following Elliot's trephine operation. The eyes presented the picture of panophthalmitis, but both of them cleared up, with restoration of vision in one of them, the media becoming clear in both. **Zaki Seddik** suggests the possibility of a small fistula along the line of the conjunctival incision becoming

the path for late infection. **Stirling** had blockage of the trephine opening in 3 cases out of 46 operated on for glaucoma. **Tooke** made a histologic examination of one of these eyes, and gives a complete report of the changes. **Stirling** thinks the stitch put in the flap may be the source of late infection. **Byers** has a paper on the complications and unfavorable results of Elliot's trephine operation, and **Filatow** reports his results with the Elliot operation in glaucoma.

**Greeves** examined microscopically specimens taken from four glaucomatous eyes in which the Elliot operation failed permanently to lower the tension, the cause being in each case prolapse of the ciliary processes into the wound made by the trephine. In no instance did the wound involve the true cornea for any distance. **Greeves** states that if the cornea be stripped superficially, and the trephine placed as far as possible forward, then the resulting wound must be well in front of the ciliary body. There can be no objection to placing the wound in the cornea, on the ground that the formation of new organized tissue is more likely to follow the procedure. Pathologic experience shows that the cornea is inert in producing new fibrous tissue in any quantity. The tissue that rapidly fills scleral wounds is produced by the episclera, the ciliary body and the choroid.

**Gunnufson** thinks the good results of operative intervention are not confined to iridectomy alone. For simple glaucoma, he prefers sclerecto-iridectomy; when this becomes acute he prefers Holth's iridencleisis. In glaucoma with fair vision, he prefers the Elliot operation. But he fears late infection and a resulting deposit of pigment on the anterior capsule of the lens, leading to cataract. In absolute glaucoma, he considers the trephine operation the most satisfactory from all points of view.

## THE CRYSTALLINE LENS.

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This review covers the literature relating to the crystalline lens from January, 1917, to April, 1918. Some references to traumatic dislocation of the lens and cataract will be found in the portion of the Digest dealing with Injuries, to be published later.

**EMBRYOLOGY.**—As the result of disturbances in growth **Vogt** states that grooves and linear elevations may occur on the posterior surface of the crystalline lens. Whitish lines and other anomalies may suggest an embryonal center of growth. They may even be found in children, and he thinks they may be concerned with the development of cataract.

**DISLOCATION OF THE LENS.**—As the result of being struck on the right eye with a baseball, a girl came to **Zentmayer's** clinic with a subluxated lens, the inferior border showing two shallow notches separated by a teat-like projection of the lens substance. The notchings were attributed to local ruptures of the zonular fibers and consequent alteration in the conformation of the lens. **Higgins'** patient had a history of repeated attacks of iritis with bilateral cataracts developing at the age of thirty-three. The right lens had been successfully removed. Upon examination it was found that the left lens had been dislocated without the patient's knowledge, doubtless due to a fall ten years prior to examination. A suitable correction gave 6/12 vision.

A man was struck on the left eye with a board causing a dislocation of the lens. When he came under **Black's** observation no trace of the lens could be found. At the time of the accident there developed an intraocular hemorrhage preventing any view of the fundus. **Posey** observed in one of his patients, a dislocated lens in the anterior chamber, while in the other eye there was a subluxation of the lens. **Marbourg's** patient complained of failing vision for a period of five years. The lower edge of the lens was found to be tilted slightly forward and there were evidences of secondary glaucoma.

**Thomson** has discussed the removal of partially and completely luxated

lenses. He refers to the dangers of cyclitis, glaucoma and sympathetic irritation. He states the removal of the lens is imperative when traumatically luxated and lying on the ciliary body. He believes iridectomy is seldom necessary, and when performed may add to the loss of vitreous. When the lens is completely dislocated and lies in the vitreous chamber, he regards it a good rule not to attempt extraction unless a clear view can be obtained.

In **Fagin's** patient there existed congenital cataracts, conical corneas and tremulous irides. The vision of the left eye was 4/200, with but light perception in the right eye. The lens was quite dense and during an attempt at needling was partially dislocated into the vitreous. This was followed by recurring attacks of iridocyclitis. Subsequently the lens was completely dislocated into the vitreous and owing to further attacks of iridocyclitis the lens was removed by the following method: With the patient looking up, a knife needle was pushed through the sclera into the vitreous engaging the lens, which was pushed up towards the dilated pupil. After the usual cataract incision the lens was pushed into the anterior chamber and extracted by the usual route. The operator states that not a drop of vitreous was lost. The eye became quiet with 20/200 vision.

**CONGENITAL AND ZONULAR CATARACTS.**—**Jackson** has emphasized the fact that poor vision is often obtained after operation on congenital cataracts because of other defects in the eye. He also calls attention to the importance of properly adapted lenses even in those patients with poor vision. Thus, in a boy whose vision was 0.08 with +8.00 spheres, a +18.00 sphere mounted one inch in front of the cornea permitted him to read 0.75 meter



type. In a patient of **Tooker's** there existed in each lens a posterior polar disc shaped opacity, surrounded by a clear ring which was in turn surrounded by an opaque annular zone near the periphery. From the posterior disc a conical opacity extended forward terminating in a small white spot at the anterior pole. There also existed bilateral corneal nebula and aniridia. -Operation was unsuccessful. There was no history of consanguinity.

**Zentmayer** observed in a child a zonular cataract with stellate opacities at each pole of the clouded zone. In two other instances patients were seen with symmetric subcapsular punctate annular opacities, just beneath the anterior capsule. **Zentmayer** also recorded the data of a patient from **Chance's** clinic. In this case the opacities were symmetrically placed in the anterior and posterior cortex and limited to one-eighth the circumference of the perinuclear zone.

In the right eye of the child seen by **Collins** there existed an eccentric pupil with pigmented strands of retained pupillary membrane adherent to the lens capsule. The zonular cataract was incomplete and from the outer edge streaks radiated in front of and behind the lens. A few cortical dots were present in the left lens. The right eye and right side of the neck were injured at birth. The right lens in **Strickler's** patient exhibited a posterior central opacity from which radiated other opacities like the petals of a flower. In the left lens there was but a large opacity with pin point opacities in the anterior layers. The vision of the right eye was 20/200, of the left 20/30. In **Spencer's** case the bilateral opacities assumed a somewhat analogous form to that of the right lens just mentioned. They were of clover leaf shape and situated in the posterior cortex.

In **Holloway's** patient the opacities were similarly situated but were triangular in shape with the base down, and as seen with a +7.00 lens measured 3 mm. The opacities were made up of closely packed dots. A few discrete punctate opacities were present in the anterior cortical layers. The same ob-

server has recorded three instances of delicate ring-shaped opacities in the lens between the nucleus and capsule, the ring being made up of delicate pin point dots. Only in its situation could it be differentiated from the lesion described as **Vossius** ring-shaped opacity. The cases were associated with definite systemic conditions and with other intraocular changes. He thought the possibility of this lesion being acquired in certain instances, could not be wholly eliminated. See cases of **Weber**, **Schwenk** and **Zentmayer** below.

In the operative treatment of congenital cataracts **Tuto** favors combined extraction in two operations. He states that there is but slight reaction, and inclusion of the iris in the wound is avoided. He expresses the opinion that the majority of surgeons are drifting away from the older method of needling. **Mulock Houwer** has written concerning operation on zonular cataracts, but the literature is not available for review.

Inheritance in its relation to congenital cataract has been referred to by **Jones** and **Mason**. In a communication that could not be consulted **Santos Fernandez** has discussed the subject of operation for soft cataract in adolescents.

**PATHOGENESIS OF CATARACT.**—**Burge** has farther recorded his interesting laboratory studies on the production of cataract. (See O. Y. B. v. 11, p. 235, and v. 12, p. 385.) The first was a brief report stating that "in the production of cataract there are at least two factors, one, the short wave length of the spectrum, the other, inorganic salts such as those of calcium, silicon, etc., which are found to be greatly increased over the normal in cataractous lenses. By increasing either of these factors separately far beyond what the eye would ever be subjected to, an opacity of the lens, or cataract, can be produced. Cortical cataract can be produced by immersing the lens in a 5 percent solution of calcium chlorid and nuclear cataract by immersing the lens in a 15 percent solution of potassium chlorid. By increasing either of

these two factors simultaneously an opacity of the lens or cataract can be produced under conditions that might easily prevail in the body."

Later a detailed report was published showing the effect of various solutions on the crystalline lens as well as the influence of the visible and invisible spectrum. He found that the short wave-lengths of the spectrum produce a molecular rearrangement in the protoplasm of the cells of the crystalline lens; so that inorganic salts, such as are found to be greatly increased in human cataractous lenses, can combine with the protoplasm to precipitate it, and hence produce an opacity. He also found that a cataract could be produced in fish living in solution of those salts found to be greatly increased in human cataractous lenses, by exposing the eye of the fish to the radiation from a quartz mercury-vapor lamp. This cannot be done by exposing the eyes of fish living in tap water, which contains only very small quantities of these salts. In looking for the cause of cataract he is inclined to believe that at least two factors must be considered, the one a modification of the protein of the lens by ultra-violet radiation, and the other certain inorganic salts by which the modified protein can be precipitated.

**Schanz** in his studies on diabetic cataract found, that through the influence of light albuminous bodies were so changed that the easily soluble albumins were transformed into poorly soluble globulins. The process is first effective in the center of the lens, so that sclerosis of the nucleus, presbyopia, and finally senile cataract develop. He then details his laboratory experiments in which the lenses of hogs were used. He found that grape sugar and above all acetone, hastens the effect of light on albuminous substances; that is, they act as sensitizers or catalysts. The acetic acid which is set free from acetone under the action of light appears to change the albumins into globulins.

**SPECIAL VARIETIES OF CATARACT.**—To determine whether *glass workers cataract* should be included among certain other industrial diseases entitling

the worker to compensation, **Legge** investigated 513 workers and found the lens involved in 17.5 per cent in contrast to 6.8 per cent in 278 individuals in other work. The characteristic opacity was the posterior central cortical type. The average age of incapacity was about fifty-six years. He stated that few workers would wear protecting glasses, owing to the slow development of the condition and prejudice, as well as to the condensation of moisture on the glass. The committee permitted the disease to be scheduled but allowed compensation only in those cases subjected to operation, then for a period not exceeding six months. **Burge** believes the prevalence of cataract in this class is due to the excess of the radiant energy factor, associated with disturbance in nutrition expressing itself in an increase in sugar in case of diabetes, calcium salts, or some other substance which can combine with the lens protein made sensitive by the action of the short wave lengths.

As a result of "windage" resulting from the explosion of a hand grenade **Mlady** eight days later observed delicate radiating opacities in the cortex while ray-like opacities extended from the center to the cortex of the lens. There was complete clearing of the lens under the use of dionin and heat, and after eleven days the vision of the right eye improved from 6/36 to 6/12. In the first case of *traumatic cataract* observed by **Wallace** the vision was reduced to hand movements as the result of an injury by a pin which perforated the cornea and anterior capsule. In the second case the eye was struck by a piece of flying stone and while at first no injury of the cornea could be detected, the lens capsule was ruptured and lens material was protruded into the anterior chamber. Later a successful needling was done. Some ten days after the injury a delicate corneal scar was discovered.

**Teulières**, after considering the various aspects of traumatic cataract and its extraction stated he believed different standards must be established for war conditions than those that prevail in civil practice. He recognizes four



classes, and the indemnity allowed varies from 5 to 15 per cent. **Mayou** has referred to a case of siderosis. The patient was a lathe worker, and with the pupil dilated, opacities could be noted in the capsule and deeper portions of the lens, associated with several rust colored spots.

**CONCURRENT CONDITIONS.**—When **Garcia Mansilla's** patient with bilateral cataracts came under observation there was a decided history of *hysteric amaurosis*. Following an operation for dacryocystitis, blindness persisted for twenty days. Later an uncomplicated extraction was done and following this there was another attack of amaurosis which persisted for three days. At the time of dismissal the vision was 2/3 with an appropriate correction. In **Weber's** case of *mongolism*, affecting a Hebrew infant 13 months old, there existed an internal strabismus and "nystagmus-like" movements associated with congenital cataracts. After stating that the only published account he could find of an association of mongolism with congenital cataract was that referred to by Hill, he briefly discussed mongolism but made no reference to the type of the congenital cataract. (See Year Book, vol. 9, p. 411.)

Recording his findings in another case of *atrophic myotonia* and cataract, **Fleischer** referred to the myopathic facies, atrophy of the sternomastoid and small muscles of the hand. Emaciation, alopecia, atrophy of the genital glands, vasomotor and psychic disturbances are not infrequent; and like the presenile cataract, are apparently due to serious derangement of the internal secretions. Cataract is often the first indication of the trouble. In **Risley's** case of bilateral *diabetic cataract* there occurred a subsidence in the amount of swelling of the lens and some clearing of the cortex while the patient was under observation. Risley stated that this is the first case in which he believed the presence of sugar was primarily the cause of the opacity of the lens. A brief note has also been made by **Robinson** concerning lenticular opacities dependent upon diabetes.

When **Schirmer's** patient was first seen there existed a post-operative *iridocyclitis* in the left eye, the right eye having a mature cataract. This was removed without an iridectomy to avoid danger of an iritis. The recovery was uneventful, and two weeks after the extraction the left eye was removed. As the patient was well under the influence of mercury and it was important for him to return to work, Schirmer felt that the conditions warranted the procedure adopted.

**COMPLICATED CATARACTS.**—**Talmey** obtained a final result of 20/70 vision after operation on a patient with *hyper-mature cataract* complicated with acute glaucoma. For the latter an iridectomy was performed and six weeks later a Homer Smith operation was performed, the extraction being resorted to a half hour after the discission. An iridotomy was subsequently required. When performing the preliminary discission in the Homer Smith operation, to make the horizontal capsular cut he recommends two separate incisions each from the periphery towards the center of the capsule. The successful extraction of a Morgagnian cataract also has been referred to by **Parrott**. Twenty-one days after the onset of Rocky Mountain fever, **Strader's** patient developed an iridocyclitis that was followed by secondary cataract.

**MACULAR PERCEPTION IN ADVANCED CATARACT.**—In order to test the condition of the macular region in cases of cataract, **Young** has resorted to two different methods, the first of which he thinks would be chiefly suitable for more intelligent patients. In the second test, which he believes would be applicable to any type of patient, he uses three discs perforated by two, three and four holes respectively, within a central area of less than 3 mm. These are placed successively in the frame and the eye is brought close to a frosted focus light showing through a large aperture of a chimney. The patient is then told to point out the relative positions of the points of light. He believes a two hole disc to be the most serviceable.



**SPONTANEOUS ABSORPTION OF CATARACT.**—**Higgins** has recorded the brief notes of a case where the vision became markedly impaired but later on distinctly improved, although there was no history of injury or operation. When the eye was examined there was a central movable pupil with considerable opaque capsule. **Menacho** has contributed a discussion on this subject, and refers to the influence of luxation and the various theories bearing on resorption. In those cases where lenticular opacities clear up he believes certain favorable changes in the general nutrition of the patient bring about improved conditions in those intraocular structures that have an influence on the lens. In his patient a subluxated congenital cataract was in the process of absorption. **Koster** has also observed a case of resorption. When examined the cataract was membranous without a trace of the nucleus. Discission sufficed for producing a return of vision.

**DISCUSSION.**—In an infant with congenital cataracts **Schwenk** attempted a discission in the one eye at eleven months, and in the other eye at fourteen months. Each attempt was unsuccessful owing to toughness of the capsule. Later the anterior chamber was opened with a keratome, the anterior capsule grasped with forceps and the lens delivered with the capsule. A similar procedure was attempted in the other eye; but the capsule was torn and some cortex remained in the anterior chamber. At the age of 16 months he ordered +8.00 spherical lens for each eye which corrected a divergent squint that existed prior to operation. Following a second discission of the lens for congenital cataract the nucleus dropped into the anterior chamber, **Zentmayer** passed a keratome behind the nucleus making slight pressure upon the cornea as the keratome was pressed back thus allowing the nucleus to escape along the blade. In the treatment of congenital cataracts **Zentmayer** believes repeated discission is the safest method. (See Tuto above.)

**NON-OPERATIVE TREATMENT OF CATARACT.**—To dissolve cataractous opaci-

ties **Pollock** employs the following: Sodium acetat, Sodium citrat, Sodium chlorid, aa gr. XL, Tr. Cocci cacti, q. s., Aq. rosae, ad. oz. IV. One teaspoonful of this solution is added to three of boiled tepid water and the dilution is employed in an eye bath for three to five minutes. After a rest of two minutes a drop of the following solution is instilled into the conjunctival sac: Trunacek's solution, (Allen and Hanbury) M i: aq., ad. dr. i. This is resorted to three times a day. After a week the salines in the above formula are increased to gr. LX and Trunacek's solution to M ii. Subsequently they are still further increased. The iodides may be added to the above solution, while dionin may also be used. The treatment is carried on for six to eighteen months in conjunction with internal treatment. (See Year Book v. 12, p. 177.) **Guilleuma** after referring to the use of iodides in cataract, cited an instance where he believed the progress of the cataract was stayed by ionization. The solution used was a one per cent sodium iodid with a current of 1 milliampere for five minutes. **Castañer Marti** testifies as to the good results obtained by the local use of sodium or potassium iodid in two per cent solution, when the vision has not been reduced less than one sixth. After referring to the importance of the early treatment of cataract **Blackburn** commented on the efficiency of Smith's recommendation of subconjunctival injections of cyanid of mercury. He has referred to his favorable results in six cases.

**Thompson**, after calling attention to the influence of various conditions of the uveal tract and the effects of eye strain as etiologic factors in the production of cataract, states that every layman is familiar with the fact that cataract is not a frequent condition even in the very old. He then refers to proper constitutional treatment, the use of dionin, subconjunctival injections of cyanid of mercury and instillations of eserine locally together with adequate ocular rest and correcting lenses. He refers to nine cases, but is not specific as to treatment.

**Campbell** has recorded an improvement in visual acuity in a rheumatic patient after the use of radiant light and heat, autocondensation and galvanism. The last was chiefly employed, the negative pole being applied to the eyes. He used three to ten milliamperes for twenty minutes daily. After three months the vision improved 20/70 to 20/30. **Adams** mentions the use of tinted lenses and a suitable correction as prophylactic measures and then testifies as to the efficiency of **Smith's** treatment. He does not mention the number of cases so treated.

As one of a committee to investigate the efficiency of *apis mellifica* in early cataract **Helfrich** found slight improvement in one of nine cases that could be kept under observation. While recognizing the few cases studied he believes the remedy to be without value. **Parenteau** has recorded his results with the use of magnesium carbonat and *secale cornutum*. **Scheube** states that inasmuch as the best results claimed for the non-operative treatment of cataract are a partial clearing of the opacities and an improvement of vision, such treatment must be regarded as ineffective. The studies of **Meyer-Steineg** have been referred to in the Year Book. v. 11, p. 238. It was not possible to consult the contribution of **Lobanoff** concerning sodium and potassium iodid.

**COUCHING.**—**Elliot** has made an excellent contribution to this interesting subject, and in separate articles has referred to its history and diagnosis. After an historical review he analyzes the collected records of 780 cases so treated in India. The cataract is approached anteriorly, through the cornea or limbus, or posteriorly through the sclera well behind the ciliary body. Among 550 cases the vision was 1/3 or better in 10.59 per cent; 1/10 or better in 21.64 per cent. He regards 60 per cent of the loss as avoidable. Iritis and iridocyclitis were responsible for 36 per cent of the failures, glaucoma for 11 per cent and imperfect dislocation for 9 per cent.

His pathologic findings were based upon a study of 54 globes. Dislocation

of the lens backward and downward was most frequently found. The inflammation of the uveal tract was of the plastic type and chiefly affected the iris and ciliary body. Proliferative retinitis was encountered but once and sympathetic inflammation was found to be rare. In the great majority of the globes the vitreous had become detached and shrunken. The retina was found to be detached in 38 of the 54 globes. He dwells upon the frequency of retinal dots in many of the cases where the retina was not detached. As to the diagnosis he states three things must be determined: first, has a couching been done; second, the position of the lens; third, the advisability of operation. These are discussed in detail.

**PREVENTION OF SEPSIS IN CATARACT EXTRACTION.**—**Herbert** has outlined his routine against infection. Dacryocystitis cases are rejected until some weeks after removal of the sac, while the chronic conjunctivitis cases are treated with irrigations until the discharge is scanty. All instruments are used dry, the knife being cared for solely by the operator. The surgeon wears a mouth screen soaked in perchlorid. Shortly before operation the conjunctival sac is irrigated with 1-3000 perchlorid for from one and a half to two and a half minutes. A few drops of 1-1000 adrenalin are then instilled, and two minutes later a four per cent solution of cocain, which is repeated every two, three or four minutes. At the end of fifteen to twenty minutes the eye is ready for operation. The meibomian glands are then expressed, after which the lids are everted and the conjunctival sac freely washed. This lavage is done with sterile water or 1-3000 perchlorid. The speculum is then inserted and the eyelashes of the upper lid beyond the bar snipped off with curved scissors. During the operation the cornea is kept moist. Before reintroducing the same instrument into the eye it is dipped into boiling water. A conjunctival flap is used.

**ATROPIN IN CATARACT EXTRACTION.**—**Fisher**, who usually resorts to a combined extraction, has found it most sat-



isfactory to instill into the conjunctival sac a drop of sterile atropin solution just after the speculum has been inserted, and then proceed with the section. By the time the operation is completed the pupil is found to be yielding widely and circularly and a mydriatic will not be necessary for three or four days. He has also found it of service in cases of iridectomy without extraction. **Thomson**, in commenting on the above suggestion, states that it is in no sense new and that he had observed on the continent the extraction of cataract with the pupil dilated. While **Fisher** introduced the drop while the patient is on the table he believed the principle to be the same. **Taylor** in referring to this procedure states that with others he has resorted to the use of atropin before extraction. He also questions whether any of the solution comes in contact with the iris and finally discusses the advantages of simple extraction. In reply to these opinions **Fisher** states that the method of **Thomson**, who introduced the drop a few hours or the day before, is quite a different procedure. **Taylor**, he believes, has equally missed the point of his suggestion, and while he opened up interesting fields, his discussion left him nothing to answer. (See **Castaner Marti** below.)

**CORNEAL SUTURE.**—**Colin** has discussed the advantages and inconveniences of simple extraction with the use of the corneal suture. As to the advantages he refers to the elimination of iridectomy, less risk of vitreous loss and shorter confinement to bed. Among the inconveniences he speaks of iris prolapse, greater frequency of secondary cataract, prolonged and more difficult operation, removal of the suture and possibility of infection. The methods of **Kalt** and **Chevallereau** are then described in detail, as are the successive steps of the operation. As soon as the anterior chamber is reformed the sutures are removed, the eye being thoroughly cocainized. **Kalt** prefers the third or fourth day, **Chevallereau** the sixth or even eighth. After moistening, the suture usually comes away readily. But at times it is more diffi-

cult and evacuation of the anterior chamber has occurred at this time. Infection occurred but three times in 800 cases. Needless to say the corneal suture is contraindicated in the presence of pathologic conditions of the lacrimal canal.

**Marquez** has likewise advocated the use of the corneal suture not only in cases of cataract, but as he has detailed in his contribution, it has been of service to him as a precaution against infection in case of rupture of the globe following a blow upon the eye. **Moron Ruiz** advocates the use of a suture in all cases, stating that it can be removed immediately after the operation in case it is not required. He believes the procedure avoids or corrects accidents which if they have occurred would ordinarily offer an unfavorable prognosis. He cites a number of case reports. **Andrade** also regards extraction with corneal suture as the operation of choice; twelve of his group of cases being by this method.

**IRIDECTOMY OR SIMPLE EXTRACTION.**—**Santos Fernandez** believes that extraction with iridectomy and a conjunctival flap, what he sees fit to describe as the American methods, is the safest and the one that gives the greatest assurance of success. **Perez Bufl** likewise believes that the advantages offered by iridectomy should make it the operation of choice and thinks they offset the simplicity of operation and absence of pupillary deformity of the simple extraction. **Blanco** and **Andrade** do not concur in these opinions. The former believes that iridectomy should be avoided when possible, altho he acknowledges that prolapse of the iris, when it does occur, is smaller than when an iridectomy is not performed. He emphasizes the frequency with which prolapse of the capsule occurs in the combined operation. In complicated cataracts he believes preliminary iridectomy justifiable.

The last mentioned observer prefers simple extraction to the combined method owing to better functional and cosmetic results. He comments on the danger of iris prolapse but believes this is rare with proper section of the cor-



nea and the use of a miotic for the first six days after operation. In all complicated cataracts he favors the combined method, or preliminary iridectomy followed in fifteen days by extraction. **Castañer Marti** advocates simple extraction and the use of a median conjunctival flap. Atropin is instilled the day before and the day of operation. Alypin and stovain are used for anesthesia. After the operation a few drops of eserin are instilled into the conjunctival sac. Taylor, as above mentioned, has enthusiastically described the advantages of simple extraction.

**IRRIGATION.**—**Newman** has added the results of two hundred and fifty additional cases where irrigation has been used after extracapsular extraction of cataract. In his total of five hundred cases 93 per cent were irrigated, and in 80 per cent iridectomy was performed. Secondary needling was required in approximately 2.15 per cent of the cases; iritis developed in 5.6 per cent, while there was some vitreous loss either primary or secondary in 2.4 per cent. The visual results were good in 91.75 per cent of the cases; fair in 6.25 per cent, and the eye was lost in 2 per cent. In twenty-six cases the iridectomy was performed secondarily. As in the previous series the incidence for iritis was rather high. It was usually late in its onset and was attributed to the idiosyncrasies of the patient. Messrs. Down Bros. of London now stock the irrigator with the laterally placed slot as used by Newman. (See Year Book, v. 13, p. 188.) **Andrews** has described an irrigator with a rubber bulb attachment, the pattern being much the same but larger than the one previously described by him. There is a receiving chamber with a capacity of two fluid drachms, so it becomes unnecessary to draw fluid into the rubber bulb.

**SUCTION METHOD OF EXTRACTION.**—**Barraquer** has described what he regards as an ideal method of extraction. To the anterior surface of the lens there is applied a tiny cupping glass which is attached to a metal stem. By means of an electric motor the air within the

cup can be evacuated and controlled. When properly applied the cataract and suspensory ligament can be manipulated and the lens completely removed without difficulty. No pressure is required, neither is it necessary to introduce any sharp instrument within the eye. He believes that loss of vitreous is prevented by the absence of pressure and the avoidance of other intraocular instrumentation. Among thirty-five mature, five hypermature and four immature cataract extractions, all were successful but two, and in these the capsule had been previously lacerated. In another contribution **Barraquer** with **Anduyned** (A. J. O. p. 370) gave a historical review of cataract operations with illustrations of their apparatus.

**Wieden** speaks enthusiastically of the above procedure, stating that the operation is practically reduced to the making of the corneal section and conjunctival flap and that iridectomy is but rarely necessary. He states that no operative mishap had occurred among 127 cases and he believes this method will supersede the Smith operation. **Marquez**, on the contrary, is not so optimistic and states that the idea is not original, a similar procedure having been described by Hulen in 1911. (Y. B., v. 8, p. 188.) He contends that the claim that it avoids secondary cataract and lessens the resulting astigmatism is not tenable. Further, the risk of infection is just as great if not greater. He concludes by saying there is no such thing as an ideal method of extraction, and then comments on the value of the corneal suture.

**INTRACAPSULAR EXTRACTION.**—In a splendid resumé of the intracapsular operation **Knapp** has expressed the opinion that a conjunctival flap is essential in the modern operation for cataract; that in many hands the vitreous loss will be higher than 5 per cent, but that post-operative iritis is much less frequent than by the capsulotomy method. He regards the necessity of subsequent needling as one of the great drawbacks of the capsulotomy method, while the applicability of the intracapsular method to immature cataracts is one of its chief advantages. He quotes

the opinions of nine American ophthalmic surgeons who have been especially trained in the Smith operation, but space does not permit a review of these opinions. He does not believe we are justified in increasing the number of poor results and failures referable to the method, in order to secure better vision in some cases. However, the results to be attained are so ideal that our endeavors should be directed towards devising some method of intracapsular extraction that is less dangerous than the Smith-Indian operation. **Meding**, referred to below, thinks Knapp's statement regarding the surgeons trained in this method should read: "Of eight who have studied under Smith, six are still enthusiastic, use and advise the operation, and one who has not been to India, uses it in fifty per cent of his cases."

**A. S. and L. D. Green** believe that unless one has had an opportunity for personal instruction and thorough training, the Smith-Indian operation should not be resorted to as a routine procedure. They mention five points to be considered in connection with this procedure. The type of cataract best adapted to it is the senile; of these the immature and the Morgagnian give the best results. Age is a factor, owing to the greater resistance of the suspensory ligament in young individuals. The deep set eyes with wide palpebral fissures and lax lids are those best suited, while the nervous patients with a tendency to spasm of the lids on slight provocation, are apt to expel vitreous. (See below.) **Hallett** has reviewed the merits of this method of extraction and his results are recorded below. **Tiffany** has also referred to the operation.

**Millette** has recorded his satisfaction with the open method of after treatment, his opinion being based on his results in over 200 cases at the National Military Home at Dayton, Ohio. He calls attention to the fact that all of the patients are men well advanced in years, and many of them suffering from the chronic ailments of old age. After referring to his technic he discusses the after treatment. The eye is examined

the morning after the operation and if satisfactory, a very light pad is placed over the eye. An aluminum shield is worn at night. If the eye is satisfactory the second morning after operation, no dressing is applied altho a protective shield is used at night. The patient is allowed to sit up the second day. He believes the above method of after treatment lessens the danger of infection.

**Mills** believes that intracapsular extraction should be performed only by men of large experience, and regards the intracapsular extraction through the intact pupil as the ideal method. While no one method should be followed in all instances, he believes the visual results in the Smith-Indian operation are ideal in selected cases, although the cosmetic results are not as attractive. In selected cases extraction of the encapsulated lens through the intact pupil is a simple procedure in skilled hands. After a typical but large Smith incision the lens in its capsule is moulded through the intact pupil slowly and cautiously, the delivering pressure being applied through the cornea by a hook, or in trustworthy patients through the lower lid by finger pressure. The lids are controlled by Prince's upper lid retractor, and Fisher's lower lid retractor. After delivery of the lens the pupil is usually displaced upwards, but if a 1 per cent solution of eserine is instilled it becomes small and centrally placed. To prevent subsequent irritative symptoms it is now Mills' custom to make three instillations of eserine at five-minute intervals while the patient is still on the table. The Greens have expressed the opinion that simple extraction is not well adapted to the intracapsular operation.

**Maynard** has almost ceased performing this operation owing to the frequency of complications; of 1,325 cataract operations performed in 1916, only 26 were removed in the capsule. Despite all precautions, he has not been able to reduce his percentage of suppurations below one per cent. **Fisher** criticises Maynard, Herbert and Elliot for condemning the operation before

seeing Smith operate. He resorts to this method in about 70 per cent of his cases, but uses a smaller incision than Smith. He attaches great importance to the iridectomy, and cuts the iris at right angles to the corneal incision. His incidence for vitreous loss was 7 to 8 per cent; and in three years he has had three cases of choroidal hemorrhage. The chief postoperative complication was iris prolapse. He states he is disappointed when his visual results are not 6/12 or better a few months after operation. **Elliot** takes exception to the above criticism and states that he criticised the statements made in support of the operation but maintained an open mind as to the actual procedure. After seeing Smith operate and then trying the operation on two or three hundred cases, he returned to the method to which he was accustomed.

**Corry** and **Shanker** believe a very large incision equalling two-thirds or three-fourths of the corneal circumference should be made in all cataract operations, irrespective of the method adopted. To support this view they have minutely discussed the physico-anatomic conditions relating to the point in question. They then discuss the various advantages and disadvantages of the large incision. The question of the best site for operation is referred to in detail with reference to their conjunctival flap suture, and their suture through the conjunctiva and external canthus to fix the "orbicularis to the temple" which controls the upper lids and eyebrows. They have discontinued the use of a bandage in ordinary cases and instead of stitching the outer canthus to the temple they fix it by a loop which passes around the ear. When the eye is closed a thin layer of cotton wool over the lids, brow, cheek, forehead and temple is held in place by collodion. The character of the paper does not admit of satisfactory discussion in this volume. An echo of the Col. Smith-Corry and Shanker controversy has been heard in this country emanating from **Green**. The reviewer questions whether the average reader who reviews this criticism, which is anything but pleasing, will believe that

it emanated from an open mind. He concludes with the statement that **Schweigger** as early as 1897 performed downward extraction of the encapsulated lens, practically as described by **Corry** and **Shanker**.

In a contribution not available for review, **Coderque** has described a new operation for cataract.

**COMPLICATIONS. DELAYED FORMATION OF ANTERIOR CHAMBER.**—On the third day after a successful extraction, **Bernstein** found the upper lid inverted, causing the wound to gape; there was also a partial prolapse of the iris with the presentation of a bead of vitreous. Reposition of the lid relieved these conditions, but there occurred successive prolapses with spontaneous replacements and the wound failed to properly close for over two months, despite the fact that a conjunctival flap was dissected up and brought over the wound. When the patient was last heard from, vision was reduced to light perception. No infection of the eye occurred.

**INTRAOCULAR HEMORRHAGE.**—**Gros** and **Fromaget** have reported concerning two instances of expulsive hemorrhage. The first occurred in a woman with moderate myopia with favorable operative conditions. After an uncomplicated removal of the lens a large globule of normal vitreous appeared in the lips of the wound. The vitreous was removed and a firm bandage applied. There was considerable ocular pain. At the first dressing forty-eight hours later, another hemorrhage occurred. The eye became atrophic. Subsequent examination showed a blood clot between the choroid and sclera, with the entanglement of the retina in the corneal scar.

The second patient was a sclerotic male with favorable local operative conditions. Immediately following the removal of the lens there was a violent attack of pain followed by a progressive escape of unstained vitreous until the globe was practically emptied. There was no external hemorrhage. The lens of the other eye was successfully removed after a preliminary sclerotomy, with an **Elliot** trephine, well back towards the equator between



the superior and external recti. With **Parrott's** patient, who was an atheromatous individual, an expulsive hemorrhage occurred several hours after an uneventful extraction. It was profuse and the oozing continued for several hours. The globe collapsed.

**INFECTION.**—**Shanker** has referred to the divergent views on suppuration after cataract operation, and quotes freely from Herbert and Fisher. When this has occurred, aside from the usual procedures he has used subconjunctival injections of 30 grs. sugar solution and 20 minim doses of phylacogen. In certain instances fibrolysin has apparently caused absorption of inflammatory products, but he also feels that it may have a deleterious effect upon the cornea. Morphin and scopolamin, as recommended by Meller, have not been satisfactory in his hands. He does not believe in tutoring a patient prior to operation, and thinks that in extraction eserine is extremely useful, and should be dropped actually in the anterior chamber and on the iris itself. See Maynard above.

**DELIRIUM.**—After a brief review of the literature **Brownell** refers to the etiologic factors concerned in 32 cases of postoperative delirium, occurring among 962 cases of extraction at the Ophthalmic Clinic of the University of Michigan from 1904 to 1917. The average age of the patients was  $72\frac{1}{3}$  years; in no case did the urine indicate nephritis; 36 per cent used more or less alcohol. Syphilis was not regarded as a factor.

The symptoms usually begin on the second night after the operation, and persist on an average of one to two days. Special nurses for all cases was regarded as the best prophylaxis. Greater success was obtained from such drugs as trional and veronal than from morphin and codein. If necessary, hypodermics of hyoscin, gr. 1/200 were given, and in the severe cases chloretone, gr.v-x by rectum. He also refers to the advisability of removing the dressing from the unoperated eye. If the anterior chamber is formed the patient may be allowed to sit up. **Thomp-**

**son** has referred to descemetitis following cataract extraction.

**GENERAL PAPERS ON CATARACT.**—Twenty-six years after the removal of a cataract for cosmetic reasons, **Black's** patient returned complaining of failing vision in the other eye, the result of lenticular opacities. The examiner was astonished to find that the aphakic eye had 20/30 vision when properly corrected.

After trying the eyes of various animals for teaching operative technic, **Fisher** found that the eyes of kittens four to five weeks old were by far the most satisfactory. The kittens are first killed, the lids and nictitating membrane removed, after which muscle operations can be performed. The eye is then enucleated and fixed in a mask which can be improvised from a cigar box. He also refers to the technic of the intracapsular operation, especially the use of his hooks and needle.

**Sherman**, while he admits that the Smith-Indian operation may be justifiable in the hands of a few, believes that it insures too great a risk to be attempted by the ordinarily trained ophthalmic surgeon. He believes one's technic should be adapted to the conditions as they arise in any given case at any stage of the operation, and that no one method is safe in all instances. **Perry** believes that "safety first" should be the dominant idea of the operator. He refers to the general condition of the patient, and believes the transient increase of blood pressure to be more dangerous than the constant. He refers to the investigation of the kidneys, conjunctiva and the importance of proper cocainization. He advises a large corneal incision and does an iridectomy in all cases. "Not over one in three knives purchased in the open market is equal to this work. The knife I use is from Weiss, London, and yet I find that even from this source, one knife in four lacks the keen edge and point for good work."

After referring to the etiology of cataract, **Hughes** refers to its treatment. He does not believe that local medicinal treatment is of value. He employs five instillations of a six per cent cocain

solution at three-minute intervals; prefers lid elevators instead of a speculum; uses a conjunctival flap, and as a rule resorts to combined extraction. He then briefly discusses the various complications of cataract extraction.

**Fellows** believes that it is not necessary to wait many hours to extract the lens after the capsulotomy in the Homer Smith operation. In making his incision, after clearing the pupillary border of the iris with the knife, allowing the aqueous to escape before completing the incision, prevents escape of the lens and vitreous. He now uses one of the several hooks on the market instead of a speculum. In case of hemorrhage following an iridectomy he washes out the anterior chamber with salt solution before resorting to the capsulotomy. **Smith** advises against the intracapsular operation in cases of hypermature cataract and when confronted by the ocular evidences of specific disease; but he believes it to be the operation of choice in immature cataracts, if there are no complications. He believes capsulotomy is indicated in young individuals and in the presence of a tremulous iris. He also believes that capsulotomy is indicated if the blood pressure is higher than 220; if sugar is present in the urine in a greater amount than three per cent; if the patient is high strung and nervous, and if there is a history of retinal hemorrhages. He prefers the intracapsular method and after this the Homer Smith operation.

As a protection to the eye after cataract extraction, **Kirkpatrick** has advised a special form of goggles, consisting of two aluminum shields which conform to the shape of the orbital margin, connected by a bridge of tape and held in place by a tape passing around the head. There is a large opening in each shield and the opening in the shield before the operated eye contains an amber glass. The day after operation these goggles are worn instead of a bandage, the patient not being confined to bed. Not only does the use of these goggles permit better drainage and more mental comfort for the patient, but in addition he believes the

eyes are quieter than when a bandage is used. **Koroleff** has discussed the question of whether life on a fleet may influence the development of cataract. **Frost's** paper concerning astigmatism of the lens after iridocyclitis, was not available for abstraction. The same is true of **Santos Fernandez's** discussion on technic in cataract extraction.

**AFTER CATARACT.**—For more or less opaque membranes **Woodruff** prefers the Ziegler knife, altho he is not partial to the Ziegler operation. For thicker membranes he speaks of the usefulness of irido-cystectomy as described by Knapp, and cites an instance where this operation gave perfect vision. He also refers to an instance where iridoectomy (Elschnig) was successfully resorted to. As some of these operations are more painful than ordinary extraction, a ten per cent cocaine solution is used for anesthesia.

**Heyl**, in discussing the question of the frequency of after cataract following extraction of mature or immature cataract, refers to the frequency of after cataract operations performed by various operators. He cites the opinion of Hess, that the extractions of immature cataracts are not followed more frequently by after cataract than extractions of mature cataract. In one hundred cases with complete cortical opacification, after cataract operation was necessary in ten; in ninety-two cases with incomplete cortical opacification, in nine; in eight cases of complicated cataract, in three. In forty-eight of the one hundred cases of complete involvement, large cortical remains were removed by the Hess shovel, while in ninety-two cases with partial involvement a similar procedure was necessary in but ten. In the Year Book, vol. 11, p. 250, reference is made to **Falchi's** peripupillary combined cystotomy. In a recent translation it is stated that recovery from this operation usually takes about ten days, and that the operation should not be undertaken prior to six weeks after the extraction.

**RESULTS.**—Among three hundred cataract operations recorded by **Kollock**, two hundred and seventy-one were successful, fourteen were doubtful, and fit-



teen were total failures. In nearly all cases an iridectomy was done. In ten of the three hundred cases a discission was performed, and in but two instances was the Smith-Indian operation resorted to. One case was complicated by an intraocular growth, another by an expulsive hemorrhage, and in fifteen cases there was a loss of vitreous. There were three instances of black cataract. In a case of buphthalmos the cataract was easily extracted and the convalescence was uneventful. Postoperative delirium was encountered but once, and in one case corneal infection was successfully treated by the actual cautery.

**Knorr** reports his statistics in one hundred cataract extractions. Eighty were combined extractions, thirteen simple extractions, two with button-hole iridectomies, and five were Smith operations. Ninety of these were successful; that is, without infection or prolapse of the iris; five were partially successful, and five were unsuccessful. Four of the latter occurred among the combined extractions and the other was a simple extraction. Of the ten unsuccessful cases two were lost from infection, while six others developed iridocyclitis. Vision was lost in four instances; loss of vitreous occurred eight times, the Smith operations furnishing four of these. In forty-one cases the anterior chamber was irrigated with normal salt solution. In forty-nine per cent the vision was 20/60 or better; in nine per cent unrecorded. **Moulton** has recorded the results of one hundred cataract operations, but as presented they do not permit of accurate abstracting by the reviewer. He believes in the use of a conjunctival flap and prefers the combined extraction except in selected cases, when he resorts to simple extraction.

**Kirkpatrick** states that of nine hundred and thirty-five operations performed at the Government Ophthalmic Hospital, Madras, forty-five were intracapsular, and in eight hundred and ninety the capsule was lacerated. Among the forty-five intracapsular operations, thirty-eight were successful,

two partially so, and five were failures; all of the last number being dependent upon vitreous infection subsequent to operation, giving rise to iridocyclitis and glaucoma. Among the eight hundred and ninety operations, 83.71 per cent proved successful, 11.46 per cent partially so, and 4.83 per cent failed. More than two-thirds of those regarded as partially successful could have been improved by secondary operations.

**A. S. and L. D. Green** have recorded carefully compiled statistics of one hundred and forty-six consecutive intracapsular extractions. Since January, 1916, they have resorted to combined extraction in preference to preliminary iridectomy. In seventy-six cases the section was corneal, in fifteen limbal and in fifty-five a conjunctival flap was used. They regard adherence of the iris to the wound, and down growth of epithelium from the wound into the anterior chamber, as the chief objections to the corneal section. As to complications, iris prolapse occurred in 6.8 per cent, vitreous loss in 13 per cent, iritis in 3.5 per cent, while in no instance did suppuration occur. Intraocular hemorrhage, glaucoma and retinal detachment each occurred in two instances. In ten cases the capsule ruptured, while in seven cases secondary operations were required. In one hundred and nine uncomplicated cases, ninety-four had final visual acuity of 20/40 to 20/15; ten had better than 10/200; two had 1/200 to L. P., while in three instances the patients did not return for refraction.

**Meding**, while he believes the Smith-Indian operation to be phenomenal for absence of irritation or inflammation, uninterrupted recovery and resulting eye health, points out that training and experience are essential and that there is no short cut. In his series of one hundred and twenty-three cases, eighty-three were by this method, and in twenty a capsulotomy was performed. In the former group, 63 per cent had a visual acuity of 20/40 or better and 18 per cent 20/70 or better; prolapse of the iris occurred in nine cases, and of the vitreous in fourteen instances. In the capsulotomy cases,



45 per cent had 20/40 or better and 40 per cent 20/70 or better. Iris prolapse occurred in five and vitreous prolapse in four cases. He attributes ocular hemorrhages to abnormal ocular conditions and iris prolapse to inaccurate section, unruly patients and disturbance of circulatory and metabolic functions during convalescence. He believes vitreous prolapse to be inseparable from cataract extraction.

After reviewing the merits of intracapsular extraction **Hallett** cites his results in eighteen cases. The vision was 20/20 or better in nine cases, 20/25 to 20/50 in five, 20/100 to 20/200 in two and in one case the eye was lost. The average was 20/25. In no instance was there a vitreous loss, but two patients developed iridocyclitis. **Tzytowski** has

tabulated his results in three hundred and three extractions, of which one hundred and thirty-six were intracapsular, while in one hundred and sixty-seven cystotomy was employed. In the former group, vitreous loss occurred in 29.5 per cent, in the latter 9.5 per cent. In the intracapsular cases, iris inclusion occurred three times; delayed closure of the anterior chamber in 4.4 per cent; iritis and iridocyclitis in 9.5 per cent. Among the capsulotomy cases these conditions respectively developed twice, 6.3 per cent and 13 per cent. Two eyes were lost by the intracapsular and seven by the capsulotomy method. By the former technic there was no instance of secondary cataract, by the latter twenty-four or 15.5 per cent.

## VITREOUS HUMOUR.

T. B. HOLLOWAY.

PHILADELPHIA.

This section reviews the literature relating to vitreous humor during 1917 and to May 1st, 1918.

**LOSS AND REPLACEMENT OF VITREOUS.**—In his experimental work with rabbits **Schreiber** found that removal of 1.4 cc. of vitreous was well borne. In only 20 per cent of the cases did persistent detachment of the retina occur. As much as a total of 3.9 cc. was removed as the result of five aspirations, and each time the eye refilled within twenty-four hours and the intraocular tension became normal within two or three days. Subsequently no notable microscopic changes were found. He believes that inasmuch as a man's eye possesses a decided capacity for spontaneous replacement, conservative treatment would seem to be indicated. He regards as unnecessary the refilling of the collapsed eyeball with isotonic salt solution.

**ABNORMALITIES.**—**Howard**, working in Verhoeff's laboratory, has made an exhaustive histologic and pathologic study of an eye removed from a five weeks old infant showing the following interesting features: The presence of

rod- and spindle-shaped as well as round granules in the pigment layer of the ciliary body and iris; indicating that the presence of the elongated form is not, as is generally supposed, a distinguishing feature of the pigment epithelium of the choroid alone. Continuity at the optic disc on the temporal side, between the two layers of the secondary optic vesicle, and absence of the medullary sheath of the optic nerve. A fibrous connective-tissue tumor of the pectinate ligament on the nasal side and absence of Schlemm's canal on the temporal side. Persistent pupillary membrane, associated with annular posterior synechia and entropion uvea, non-inflammatory in origin. Processes with zonular fibers from the posterior surface of the iris, and long retinal processes of neuroglia tissue extending into the vitreous. A fibrovascular sheath of the lens, associated with a persistent hyaloid artery and cortical cataract. Zonular fibers in various situations and in different stages of devel-

opment. Vitreous fibers appearing in various stages of development, the fibers arising from the fibrovascular sheath predominating and proving in a very conclusive way, it seems, that part of the vitreous at least has a mesodermal origin. The whole contribution shows careful work and may well be reviewed by all ophthalmologists whether or not they are particularly interested in this phase of their specialty.

**Zentmayer** observed a retained hyaloid sheath, that appeared as a white membrane that could be traced into the vitreous for some distance from the upper and inner quadrant of the posterior lens capsule. It again became visible more posteriorly as a greenish white mass attached to the disc. In the right eye of a young girl **Boyd** observed a fibrous band extending down and in from the disc.

**CHANGES FROM SEPTIC PENETRATING WOUNDS.**—This contribution from **Elliot** has evolved from his studies of *couching* of the lens as referred to in the chapter on the lens. He refers to the opinion of Straub that hyalitis is due to a chemotaxis following the deposition of septic matter in the vitreous, but believes that this fails to sufficiently weigh the importance of infection of the surrounding structures. In couched eyes the appearance found in the vitreous included slight gauzy films, filmy masses in the anterior part of the inflammatory foci therein, total detachment of the retina with inflammatory matting of all parts, and the remains after panophthalmitis. Detachment of the retina was found in 70 per cent of the cases, and this was explicable by the pouring of exudate into the vitreous chamber, adhesion of the exudate to the retina, and a shrinking of the exudate. He believes this pouring out of exudate into the vitreous is dependent upon a primary infection of the surrounding vascular coats rather than upon a chemotaxis from an infected vitreous.

**HEMORRHAGE INTO VITREOUS.**—**Appleman** has contributed a report on three cases of massive spontaneous hemorrhage into the vitreous, the ages

of the patients being forty, twenty-one and twenty-seven. In one case the Wassermann was positive, in another negative; while the third had a negative serum Wassermann but acknowledged a specific infection; he also had a positive gonococcus fixation test. The patient with the negative Wassermann had had three miscarriages, had an extensive pyorrhea, and albumin and casts in the urine. The author discusses the etiology and treatment of these cases.

In a woman aged 61, **Spencer** observed a large vitreous hemorrhage in one eye, the fundus of the other eye being negative except for tortuous vessels. The intraocular tension was eleven; the urine negative and the blood pressure not excessive. Wassermann and tuberculin tests were not made. **Robinson's** patient was a luetic male, age 50 years. He had had several attacks of hemorrhage, the first, three years before coming under observation. **Harrison** has referred to traumatic intraocular hemorrhage. He believes the prognosis is very favorable even in elderly individuals.

In a patient with recurrent vitreous hemorrhages, **Westphal** employed subconjunctival injections of thiosinamin and antipyrin with seemingly good results. He adopted the method of Horeau and Michel, 1 cc. of the solution containing thiosinamin 0.1 and antipyrin 0.0075. He began by injecting one-tenth cubic centimetre of this solution. He states that two injections a week are sufficient and that more than two milligrams of thiosinamin causes ocular irritation.

**ASTEROID HYALITIS OR SNOW-BALL VITREOUS OPACITIES.**—**Stark** has placed on record three histories detailing his observations concerning those interesting snow-white opacities that have been described under the title of asteroid hyalitis—more or less globular opacities that do not settle to the bottom of the vitreous chamber. Two of his patients were males, and in all the right eye only was affected. One patient had a positive Wassermann and in another this test was negative. After a review of the literature at his dis-

posal he was inclined to believe that syphilis played a role in the etiology.

**Holloway** has recorded four similar observations, bringing the total to thirteen; and with the cases of D'Oench and Argyll-Robertson to fifteen. Of the thirteen all were over fifty years of age but one. In two instances the involvement was bilateral, in seven the right eye only and in four the left eye. He believes these opacities are more prone to occur in elderly individuals, and probably as the result of a process analogous to that concerned in the production or deposition of cholesterol in the vitreous, or possibly as one of the stages in the same chemical process.

**TREATMENT OF VITREOUS OPACITIES.**—**Peck**, before taking up the treatment of vitreous opacities, briefly refers to the structure of the vitreous and to the etiology of vitreous opacities. He thinks synchysis scintillans is probably due to faulty pancreatic and hepatic metabolism. Careful refraction is of course advised in cases of myopia. As to hemorrhages in the vitreous, he advises rest in bed, salines, morphin and protective glasses, with appropriate treatment of the inciting cause; prolonged use of calcium chlorid being advised in recurrent hemorrhages. See Appelmann and Westphal above.

## THE RETINA.

MARCUS FEINGOLD, M. D.

NEW ORLEANS, LA.

This part of the Digest includes the literature of the retina for the year 1917 and up to May 1st, 1918.

**ANATOMY.**—**Krückmann** considers as lymph passages around the capillaries of the retinal vessels the spaces which he demonstrated between the endothelial tubes and the membrana limitans gliae perivascularis.

**ANOMALIES.**—**Botteri** has written on anomalies of eye-ground in new born. Several cases of *opaque nerve fibers* are reported by **Menacho**. Some of these eyes showed congenital cataract. An unusually large rhomboid area of opaque nerve fibers in one case indicated by the striation a curved direction more or less concentric with the macula. A horizontal dehiscence in the nerve fibers, about one half disc diameter high, began about one disc diameter from the temporal margin of the disc and extended to the temporal edge of the area. The macula showed extensive destruction with localized accumulation of pigment.

**Pringle's** patient showed a large patch of medullated nerve fibers along the upper temporal vessels, some distance from the disc. A smaller one was situated about two disc diameters from the temporal side of the macula,

was less compact, and consisted of fine silvery threads.

The *optico-ciliary vein* in **Herrenschwand's** patient arose from the lower temporal margin of the papilla in the right eye, and in the left eye it came from the lower nasal border. Because pressure on the eye would empty the blood sooner from them than from the other retinal veins, Herrenschwand considered them rather anastomotic than independent veins.

**Holloway's** patient showed an optico-ciliary vein in the left eye only. As a small vessel it entered the inferior temporal vein between the exit from the papilla and disc margin. It described an S-shaped course and disappeared, at the nasal margin of the disc, into the choroid, where it could be followed for a millimeter or two. In color it corresponded to an artery.

A *loop of a retinal vessel* was shown in **Feingold's** patient, who presented a true Fuchs' coloboma or conus at the lower margin of the disc. A fold of retina, bridging over the staphylomatous sclera, formed a pocket into which the lower temporal vein extended in a



U-shaped loop, appearing veiled through the duplication of the retina. Similar cases have been reported by Coats and by von Szily.

According to **Pringle** the *aneurisms* found in each retina of his patient might possibly be looked upon as a congenital anomaly. His patient, a soldier of 23 years with normal vision, showed beside medullated nerve fibers in the left eye, several aneurisms in each retina. In the left eye the aneurisms all sprang from the lower branch of the upper temporal artery. The dilatations of the vessels were all placed close to one another. Some were small, others large; some were fusiform, others resembled the bulb of a Higginson syringe. In the right eye the inferior temporal and inferior nasal arteries showed dilatations, similar to those in the left eye, but much smaller, and in the extreme periphery and therefore difficult to see. These swellings are aneurisms and are filled with blood; the blood stream can be traced through the center. Pulsation can be produced by pressure on the eyeball. The veins had no connection with the aneurisms. See also retinal degeneration with aneurisms below.

In a paper illustrated by 25 drawings **Menacho** illustrates various anomalies observed by him concerning division, branching and distribution of the vessels, coiling of the veins around the arteries, ciliary retinal vessels, direction of the vessels to the nasal side, etc.

PHYSIOLOGY, CHEMISTRY AND PHYSICS.—**Kumagai** has written on the behavior of retina under chemical and physical stimuli. **Albarenque** examined the retina of *Didelphys Marsupialis* subspecies *Azarae*, a purely nocturnal animal. The retina was fixed in osmic acid or in Tellyesnick's fluid. Both teasing preparations and paraffin sections were made, and in all the absence of cones could be clearly demonstrated. That this absence of cones was not due to the faulty technic is proven by the fact that Albarenque found, by these same methods, cones in the retina of the rabbit. The fact that the retina of this nocturnal animal contains rods only, Albarenque considers as proof

enough to support the doctrine that rods are the organs for vision in darkness and cones the organs for daylight vision.

In continuation of some work on the retinal pulsation published in 1909, **Bailliart** is attempting to determine the arterial pressure within the eye. It is to the variable pressure and difference between the pressure extremes, systolic and diastolic, that the arterial pulsation is due. The moment the extra-arterial pressure reaches the height of the diastolic pressure the slackened arterial walls vibrate at maximum and the pulsation becomes visible. When the intraocular pressure is increased, as in glaucoma, or when the diastolic pressure is diminished, as in insufficiency of the aorta, the retinal pulse appears spontaneously. But most often it will be necessary to increase artificially the intraocular pressure, by pressure on the eyeball, in order to provoke the retinal pulsation. If the pressure on the eyeball be further increased, then the pulsation will entirely cease and slight gradual release of the pressure will make the pulsation reappear. To know the figures of the systolic and diastolic pressure it is necessary, therefore, to measure the pressure on the walls of the artery. This pressure consists of two factors, intraocular pressure and digital pressure on the eyeball.

Since the intraocular pressure can easily be measured, one needs only an apparatus to measure the pressure on the eyeball. Bailliart used the Bloch-Verdin sphygmomanometer. The individual to be examined is prepared for ophthalmoscopic examination, preferably by the indirect method, and the assistant, standing behind, applies the apparatus on the external commissure of the lids. When the first pulsation is noticed the manometer is read, then the assistant continues pressure until all pulsation disappears; the compression is gradually released until the re-appearance of the first pulsation and again the manometer is read. Fifty soldiers were examined and the intraocular pressure was not taken, but assumed to be equal to 20 mm. In order to produce the first arterial beat, that

is, to counterbalance the diastolic pressure, an average pressure of 47 mm. was necessary. If to this is added the assumed intraocular pressure of 20 mm., this would then give 67 mm. for the diastolic arterial pressure. To counterbalance the systolic pressure (reappearance of first pulsation) an average pressure of 78 mm. was necessary, and adding to it the 20 mm. of intraocular pressure a systolic pressure of 98 mm. is found.

When the individual examined observes with this same eye a bright surface through a blackened tube, his visual field darkens from the nasal to the temporal side; colored lights disappearing in about the same time as white ones. The blindness is produced when the systolic pressure is overcome and the blood wave does not penetrate the arterial branches. The compressed eye sees the pulsation of its own arteries the moment when the counterbalanced diastolic pressure is followed by the appearance of strong beats. The pulsation becomes visible to the individual examined generally with a pressure of 40 mm. An average pressure of 69 mm. was necessary to suppress all sensation of light, but one must remember that the blindness only comes on a few moments after the necessary pressure has been used. The interval is of different lengths in different individuals. It will be interesting to repeat these experiments on patients with chronic glaucoma with comparatively normal tension. When spontaneous retinal pulsation exists it will be necessary to determine whether it is due to increased intraocular tension or to diminished arterial tension. In cases of increased intraocular tension without spontaneous pulsation, one will have to assume and search for a local arterial hypertension.

**Dunlap** made experiments to determine the shortest perceptible time intervals between two flashes of light on the same retinal area, that will allow the two to appear separately. It had been found before that the time-threshold became low as the lengths of the flashes were increased. Special apparatus was constructed. The net re-

sult of the experiments was to show the unreliability of determinations, on the dark adapted eye, for flash lengths less than 1/10 of a second. The threshold is low with light-adaptation. The chief value of these experiments lies in the complex psychologic conditions of the judgments involved. (See also *Diagnosis*, p. 4.) **Lipkin** has written on the influence of intermittent light on the retina, and **Ruchnich** on the study of visual rhythm.

**Detwiler** found that the contraction of the cones and the migration of the pigment of the tortoise and lizard is not abolished by dividing of the optic nerve.

**Grünbaum** has investigated the subject of ocular *fatigue* by comparing intermittent with constant illumination. The length of intermission could be varied, and the point at which it gave the effect of constant illumination was noted. He finds ocular fatigue to be a condition that is both central and peripheral, and that when one eye is experimented on the other also shows fatigue but less in degree.

**SUBJECTIVE PHENOMENA.**—**Troland** writes on the measurement of visual stimulation intensities, and **Jones** on retinal sensibility to hue differences. **Luckiesh**, investigating the Purkinje effect, found that the value of red and green light, obtained by him with the direct comparison method, for a wide range of illumination, was only 62 per cent of the value obtained with a flicker photometer. **Weiss** has written on the Purkinje experiment.

To study the effect of bright surroundings on foveal vision, **Cobb** and **Geissler** used a box approximating a sphere in shape, painted white inside and illuminated with an electric light through a milk glass. The observer's face fitted into a hole in one side of the box; and he could, through an opening in the opposite wall, watch the test fields 6 to 8 cm. in size about two meters from the eye. The conclusions are as follows: Different individuals may show fairly wide differences in the vision of objects of very low brightness, both with and without bright surroundings. The relative changes in



visual capacity caused by differences in surroundings were found to be on the whole in the same direction in cases of the same change in the conditions. For objects of relatively low brightness, the presence of a surrounding field of relatively high brightness has the effect of lowering the capacity of vision, both for details and for brightness-difference. Surroundings of a brightness about equal to or less than that of the test objects show, on the whole, no consistently better or worse results than dark surroundings with the identical test objects. Visual acuity under these circumstances was perhaps slightly improved. The difference threshold was apparently slightly increased while its diffusion was distinctly diminished. The ambiguity of the latter findings makes further work on the difference threshold desirable.

**Ovio** observed a red border at the edge of the black print after he had been looking at the country from the railway coach for some time. This illusion he explains in the following way: The eye possesses varying excitability for different colors and at times chromatic aberration of the eye may play a role in the production of the phenomenon. When light reaches the retina through the lids or sclera a sensation of red is experienced and, if lasting for some time, will slightly lower the sensibility of the retina for red. In this way white lights will produce a sensation of green, but black objects appear red as the after-impression of the red from the insolation, because the retina is not excited by the black and because the green sensation of white objects produces, by contrast, a sensation of red in the area of the retina upon which are depicted the images of the black objects.

An insulated eye has, therefore, from black and white objects the sensation of red on those parts of the retina where the light from the object looked at is absent or weak, and has the sensation of green in the regions acted upon by strong light from the object. With colored glasses it is also possible to have the sensation of the color of the glass

employed, and of the color complementary to it. The first sensation is received when the direct impression predominates; the second sensation when the individual succeeds in forming an abstraction from the direct impression. This way it is possible to see, through a colored glass, objects in their own color and, by paying close attention, it is also possible to see upon these objects, the color complementary to that of the glass employed. The red margin on black is presumably a special manifestation of these marginal chromatic phenomena which seem to be due to a different excitability of the eye for various colors; **Ovio** would explain it with a special tremor of the fatigued eye, analogous to the intentional tremor of the fatigued fingers and hands.

**GENERAL PATHOLOGY.**—The histologic examination of the right eye with subchoroidal hemorrhage, of a soldier struck by a piece of shrapnel, leads **Collins** to argue how such a condition would appear ophthalmoscopically. It will hardly show as an elevation but the retina will be whitish-opaque, because the hemorrhage between sclera and choroid compressing the choroidal vessels in that area would thereby impair the nutrition of the retina. It is probable that commotio retinae and holes at the macula may both result from temporary ischemia of the choroid by subchoroidal hemorrhage. Cutting of a posterior ciliary vessel will, as shown by the experiments of **Wagenmann**, disturb the blood supply in the choroid, and its ischemia will lead to a clouding of the retina to be followed by pigmentation of the retina and atrophy of the choroid. Extraocular rupture by concussion injury remains to be proven; but there is evidence that it may produce subchoroidal hemorrhage, and in this way, later pigmentation of the retina. Pigmentary disturbance in the macula after contusion may have a similar origin.

In the retina of his case of Essential Atrophy of the Iris **Feingold** (169) found a 1.5 mm. area at the temporal margin of the disc in which the ganglion cells were entirely absent; here



peculiar bodies much larger than ganglion cells were found, of various shapes and often showing long thin processes. They were surrounded by clear places, bridged over by fine threads. These bodies were found only in this region, and the balance of the retina was practically normal. These bodies may be interpreted as either varicose nerve fibres, or as the peculiar changes found in the ganglion cells of the retina by Schreiber and Wengler. The influence of the toxins from the destruction of the iris may be held responsible for the changes in the retina.

**THERAPEUTICS.**—**Ridley** found injection of normal or hypertonic saline solution with the addition of 1/5000 cyanid of mercury for antiseptic reasons, 15 to 20 minims into the orbit along the outer wall, beneficial in various forms of retinitis; tubercular, luetic, pigmentary degeneration, etc.

**LEUKEMIA.**—Whether the white spots found in the retina in patients with leukemia really are leukemic new-formations is still under discussion. This view is strongly held by Meller and was endorsed by **Koyanagi** in a recent paper (*Y. B. v. 13, p. 203*). He now quotes the following case in confirmation of it: A man, aged 24 years, died of simple lymphatic leukemia fifteen months after the first symptoms. About six months before death he first complained of dim vision of the right eye; and in the macula above and to the temporal side of the disc there were several small retinal hemorrhages. No white spots could be seen at this time. No further ophthalmologic examination was made, but the bulbi at the autopsy were fixed in Zenker's fluid for histologic examination.

This showed in the left eye a circumscribed tumor-like swelling above the disc; an accumulation of medium sized lymphocytes and no admixture of red blood cells. The accumulation lies in the nerve fiber layers; the blood vessels are not dilated and show no pathologic changes. There is absolutely no outlining of the focus by red blood cells. A similar but much larger focus in the macula contains a hemorrhage in the center. Varicose nerve fibers and perivascular

lymphocytic aggregations are seen here and there. Small hemorrhages with a few leucocytes are disseminated almost through the whole retina. No focus behind the lamina cribrosa.

In the choroid was a moderate extravascular infiltration. Right eye shows the same changes but the accumulations were smaller, never forming a tumor-like swelling, but the choroid was much more affected. The leucocytic aggregation in this case cannot be looked upon as the result of varicose dilatation of the blood vessels, as in other cases, nor the result of an extravasation of lymphocytes. **Koyanagi** assumed that the lymphocytes grew exclusively at the place where they congregated in the adventitia of the blood vessels. In the macular focus with a central hemorrhage he assumes the lymphatic aggregation to be due to a perivascular hyperplasia and the hemorrhage as a consequence of this infiltration of the vessel walls.

**RETINAL CONDITIONS FOLLOWING INJURY.**—**Frenkel** reports and illustrates peculiar changes in the retina of a soldier's right eye, which he attributes to the effect of windage, i. e. the compression of the eyeball at several points of the orbital walls during the time the eyeball was pressed in by the explosion nearby. The Wassermann had been found positive eleven months before when foci of chorio-retinitis were seen in the lower part of the retina. Under treatment vision improved. About one year later **Frenkel** saw the patient for the first time and found a slight detachment of transparent retina above the disc; and in the lower macular region a whitish line, concave upwards, with a reddish reflex on the convex side; macula normal. In the upper periphery were two, and in the lower periphery, three large, more or less round or oval white lines, enclosing almost normal retina or areas with whitish spots and whitish discoloration. These round areas **Frenkel** attributes to the impact of the eyeball on the bony walls of the orbit by the bursting shell two meters away. **Purtscher** has again written on traumatic retinal angiopathy. (*See Y. B. v. 10, p. 351.*) See also obstruction of retinal vessels.

**ARTERIAL PULSATION.**—The pulsation of the retinal artery in **Holloway's** two patients was due to cardiac and vascular disease. One patient had aneurism and aortic murmur, the other had mitral and aortic disease. In the discussion importance is emphasized that patient, ophthalmoscope and observer be absolutely steady, otherwise pulsation may be simulated; patient and observer are to rest their arms on a table. A case is reported in which a pin-point corneal opacity produced the impression of artery pulsation.

Pulsation of small arteries in the retina of **Wolff's** patient was due to aortic regurgitation. In the discussion **Weeks** relates that his patients with heart disease often complain that vision becomes diminished on exertion. **Weeks** considers it due to temporary increase of intra-ocular tension.

**ANGIOSCLEROSIS.**—While acknowledging the monumental work done by **Marcus Gunn** in establishing retinal signs of arterial sclerosis, **Bardsley** believes that these cardinal signs do not necessarily indicate arteriosclerosis, but are often due to some accessory cause. The following are to him the signs of high arterial tension and those of angiosclerosis. (a) Tension: vessels are uniformly distended, the light streak is broader and much brighter, often being like copper wire; arteries indent veins. (b) Sclerosis: irregular tortuosity, light streak more brilliant and narrow, irregular caliber and beading, diminution in size of vessels and silver wire reflex.

High tension and sclerosis frequently coincide, but not always. Blood pressure is raised by toxic infection (teeth), and the signs disappear with elimination of the pressure and the cause. Silver wire sclerosis never changes. High blood pressure, as from aortic disease, may last a lifetime without vascular sclerosis. Experiments with adrenalin to raise the blood pressure confirm his views; and he believes that an approximate estimate of the blood pressure can be arrived at by observation of the retinal blood vessels, of the amount of indentation and of the brightness of the streak.

Certain pitfalls must be avoided. (1) Errors of refraction which blur the de-

tails. (2) In severe toxemias the retina would show broad arteries, increased light streak, engorged veins with slight indentation; but all of these symptoms are due to the toxins and disappear when the blood pressure improves after small doses of digitalis. (3) Failing heart in prolonged high tension and sclerosis.

In an excellent paper full of details and accompanied by illustrations and drawings, the evidence of close and persistent examination, **Moore** attempts to create the picture of *retinitis of arteriosclerosis* and to establish its relation to renal retinitis and to cerebral vascular disease. Retinitis of arteriosclerosis is a separate clinical entity, distinct from renal retinitis. In arteriosclerotic retinitis the sclerosis of the arteries precedes the exudate and is well marked. In renal retinitis, on the other hand, vascular disease is less marked and the other manifestations of retinitis are present. Retinal hemorrhages are smaller and more scattered than in renal retinitis. In arteriosclerotic retinitis exudates are white dots, or spots, are sharply defined, and as a rule scanty. They develop slowly and change slowly; they disappear without any trace. Some patches are larger but have a hard edge, are dirty white and irregular in outline. Patches of soft edged exudate (wool, cotton wool, snow bank, etc.) are rare in arteriosclerotic retinitis, and are probably evidence of renal insufficiency.

In arteriosclerotic retinitis edema does not occur and detachment is rare. Star figure may occur in either. Arteriosclerotic retinitis is often unilateral; renal retinitis seldom unilateral for more than a few days or weeks. Subjects with arteriosclerotic retinitis may often live a number of years, and the death is referable to disease of the vascular system and not to disease of the kidneys. Of 44 patients with cerebral lesions 31 showed retinal vascular disease, 19 of very severe degree; 27 died; causes of death known in 26; 12 of these had vascular cerebral lesion. Of 46 patients with severe retinal vascular disease, 21 had suffered from a cerebral lesion or developed one in the course of about three years.



Urging cooperation with internists when even the first stages of arteriosclerosis in the retina are discovered **Wright** divides the changes in three stages. 1. Dilatation of vessels: presclerosis; 2. Contraction and local changes in vessels: established sclerosis; 3. Exudates, hemorrhages, edema, etc.: end results of sclerosis. First stage: bright streak is broader and brighter, vessels are tortuous, changes in small vessels first, in one eye only; arterial pulsation. In the second stage minute opaque spots break the continuity of the central stripe; fine white lines along the artery, later opaque spots or lines surround the vessels that are now contracted, silver wire, arteries indent veins. Last stage: edema, hemorrhages, etc.; but already general systemic disturbances are seen.

Enumerating the symptoms of retinal angiosclerosis, **Moulton** cites three cases illustrating their prognostic significance. (1) A woman of 70 years showed in the right eye a small retinal hemorrhage and floating filaments in vitreous; vessels whiter and less distinct. Six months later hemiplegia, and death one year after. (2) A woman of 48 years with syphilitic angiosclerosis showed hemorrhages in right vitreous. After proper treatment again normal vision and restored general health. (3) A man, 52 years old; Menière disease from bleeding in right labyrinth; sugar in urine, blood pressure 180; vision below normal; compression of veins by crossing arteries well marked. Diabetes the cause of vascular disease in this case. Patient still alive, well. **McCaw** demonstrated a patient with retinal arteriosclerosis in whom Jackson had found newly formed retinal vessels.

**VASCULAR DISEASE AND PROGNOSIS AS TO LIFE.**—**Adams** endeavored to trace the final history of patients with vascular disease of the retina. Data of about 124 cases were collected. Retinal lesions are more common in women than in men. They are not altogether due to pregnancy since almost one-third of the cases have been in unmarried women. The older the patient the better is the outlook as to life, regard-

less of the presence of albumin in the urine. The presence of albumin in the urine makes the prognosis still worse in the young.

**RETINAL HEMORRHAGE.**—**Genet** reports a case of retinal hemorrhage during hemoglobinuric bilious fever, in a soldier of 27 years stationed in the colonies. In 1916 he developed a first attack of hemoglobinuric fever; on return to France a second attack; repeated vomiting and jaundice; urine showed albumin and hemoglobin. During recovery patient complained of blurring of the left eye. In the left eye hemorrhage in the macula bounded above by a horizontal line passing through the center of the macula with a lower semicircular border; a small, dot-like hemorrhage along the inferior temporal artery. In the right eye a very small dot-like hemorrhage in the macula near the center.

**Amsler** again writes of the etiology of hemorrhagic retinitis, (*Y. B.*, v. 13, pp. 203, 206, 209).

**RETINAL TUBERCULOSIS.**—**Finnoff's** patient, a ranchman of 28 years, showed small deep-seated infiltrations in each cornea, and in the fundus greyish exudate was covering some of the veins and one artery. Later small hemorrhage showed in the right eye. Wassermann, urine and teeth negative. Irregular haziness over the veins showed up after tuberculin injection and is apparently a focal reaction. Patient had a cow which was suspected of tuberculosis; was given bovine tuberculin and gradual improvement resulted.

**Spencer** reports three cases of tuberculosis: (1) A man of 32, whose left eye was failing for three months. Vitreous was hazy, the disc hyperemic; many hemorrhages about the retinal vessels with area of retinal proliferation. Luetin test negative, but decided local and general reaction after old tuberculin. Patient declined treatment. (2) A woman of 27 years, vision of left eye reduced to light perception with good projection. Massive hemorrhages in the left vitreous and details of the eye-ground could not be seen. Active tubercular lesion in the right apex. (3) A man of 20 years; left eye inflamed



for a few days, objects looking smoky. Fresh blood in the vitreous made it impossible to see retina and disc. Disc looked red; local and general reaction to tuberculin.

**Bane** reports two cases: (1) A man of 22 years; poor vision right eye three days; several hemorrhages in vitreous. Under potassium iodid vision improved to 5/6, and vitreous was clear. Soon the vitreous again became hazy, and the disc indistinct. Was given 10 grains calcium lactat, and K. I. continued, but in smaller doses. (2) A man 21 years old; three years before poor vision of right eye, vitreous hazy. Was given iodid; gradual improvement until one year later when he developed left psoas abscess, finally vision failed so that now he can only see hand movements. Grayish black mass in vitreous; von Pirquet negative, and bovine tuberculosis, but subcutaneous injections of tuberculin positive.

**Lansdale's** patient, a man 22 years old, had blurred vision of the left eye one month. Vision 20/200; hemorrhagic retinitis. In the discussion this case is declared to be probably one of tuberculosis of the retinal vessels. In discussion Jackson reported a case with hemorrhage in the macula giving a focal reaction from tuberculin.

**Black's** patient, a man of 23 years, showed a massive exudate in the nasal part of the retina of the left eye; and, preceded by hemorrhages, later also in the same place in the right eye. Tuberculosis suspected. General and focal reactions could be produced by large enough doses of tuberculin.

**Wallace's** case, a man 33 years, suddenly lost the vision of left eye. Disc hazy, elevated; veins unusually large; small hemorrhages about the disc; on nasal side of the macula round white spots. Jackson finds the case suggestive of tuberculosis of the retina.

**RETINITIS PROLIFERANS.**—**Week's** patient, a man of 44 years, had poor vision for ten years. Two desperate attacks of retinal hemorrhage one month apart; each attack reduced vision to light perception. Only partial restoration of sight. Examination showed signs of old central choroiditis. Nar-

row bluish-white bands follow the vessels out from the disc and swing forward into the vitreous.

**Findlay's** patient with retinitis proliferans was in healthy condition; no causative factor could be found and in the discussion the diagnosis of exudative retinitis was suggested.

**Wallace** reports proliferating retinitis in a man 26 years whose vision became impaired four years ago. Football injury to the head some years before. Proliferation of vessels in places.

In **Ischreyt's** patient, a man of 29 years with lues, the arteritis and periarteritis lead to obliteration of vessels, and formation of connective tissue in the vitreous, of the character of retinitis proliferans, in both eyes. The arc-like figure surrounds a small pigment focus on the nasal side. Posterior synechia and pigment on anterior capsule.

The case of central recurrent retinitis which **Hirschberg** has had under observation for twenty-seven years, has shown frequent recurrences and has responded well to antiluetic treatment. A parafoveal focus remained after one attack; and bluish infiltrations subsequently appeared in this neighborhood, suggesting a partial blocking of the blood at the old focus. A scotoma with full central vision finally resulted.

**EXUDATIVE RETINITIS.**—In **Crigler's** patient, a girl of 14 years, with hereditary lues, the retina was elevated unevenly as far as the equator; at the anterior border of the elevation were small hemorrhages and one or two amputated veins. In the lower temporal periphery an area of chorio-retinitis with small hemorrhages; retinal vessels distinct until they reach the periphery. The massive exudation occupies all except the lower nasal part where the background presents a silver white appearance with cholesteroline crystal deposits in different parts of the retina. In the discussion the case is declared to be one of massive exudation of Coats.

**Ischreyt's** patient, a woman of 60, showed a grey opacity which, beginning 2 disc diameters above the right disc, turned arc-like to the macula and seemed folded. The artery crossing it

is tortuous, the vein runs smoothly. A similar condition in the left eye. Ischreyt considers the folds in the retina due to an exudative process in and behind the retina: a kind of exudative retinitis. The macular changes are possibly senile.

**van Schevensteen's** patient, a soldier with *ictero-hemorrhagic spirochetosis* showed, during convalescence, left vitreous opacities; later a patch of chorio-retinitis in the periphery of the right and left fundus; hemorrhages about the diseased area. Choroido-retinitis ultimately appeared in the course of resolution and no vitreous opacities. In one other case mentioned by him he found no fundus changes and in a third case signs of a past iritis.

**SYPHILIS.**—**Fuchs'** case of central recurring syphilitic retinitis was noticed last year. (See Y. B., 1916, p. 215.)

According to **Masuda** recurring central retinitis is very common in Japan; no fundus changes are present, vision decreases and central scotoma is noticeable. With the Thorner ophthalmoscope very minute changes in the pigment epithelium and slight edema of the macula can be seen.

**OBSTRUCTION OF RETINAL VESSELS.**—**MacKenzie's** case is very interesting on account of the diagnosis. A woman of 59 years found the vision of right eye failing, suddenly, 10 days before. The upper half of the right disc showed a translucent bluish-white pendulous swelling, giving the impression of a blister ready to rupture. Edema extended from the disc onto the retina, and was circumscribed by the two superior arteries. On the temporal side of the disc, the fundus was pale, salmon colored. Radial hemorrhages all over; veins dilated and tortuous; arteries somewhat narrow. Within a few days vision improved to normal, edema became less marked and the veins of the disc narrower than in the periphery. Hemorrhages began to clear rapidly and gradually reduction in the size of the upper arteries was noticeable. Still later a tuft of snow-white exudate about 1.5 disc diameters above disc could be seen. Between it and the disc the artery was barely visible, be-

yond it, it appeared red, but like a thin twisted tape. MacKenzie looked upon his case as one of coexistence of occlusion of the superior branches of the central artery with occlusion of the accompanying veins for the following reasons: That occlusion of the veins existed is evidenced by the typical hemorrhages throughout the fundus, by the dilatation and tortuosity of the veins; that occlusion of the artery existed is revealed by the edema of the optic nerve, by the pallor of the fundus, by the narrowing of the upper branches, and by the subsequent atrophy of the upper half of the disc. The total blindness of the lower field and the preservation of the upper, indicated a graver lesion in the upper half of the retina. Since the whole retina showed signs of occlusion of the veins the defect of the lower field must be due to the obstruction of the upper arterial branches. Coexistence of occlusion of the arteries with occlusion of the veins has been reported by trustworthy authorities and has been found more often in the branches than in the main trunks of the vessels.

**Ring** has reported sudden obstruction to retinal circulation in cardiovascular disease. (Y. B. v. 130, p. 205.)

Thrombosis of the superior retinal veins apparently one year old, was present in **Krauss'** patient, a woman of 48 years with high blood pressure and latent lues. The thrombosed section was replaced by innumerable fine corkscrew-like vessels surrounding the opaque area of the retina. A macular vein showed enormous dilatations. This collateral circulation possibly explains the almost perfect field and good central vision.

**Hoover** reports two cases of embolism of the central artery. (1) A man 65 years old could not see with his left eye one morning; once or twice previously he had noticed dimness of vision of that eye. Tension was increased, pupil dilated and irregular; vessels whitish, retina grey-white; optic nerve atrophic. (2) A woman of 32 years had headaches for about ten days, then fell unconscious. That afternoon the left eye was blind. There was whit-



ish opacity of the retina; increased intraocular tension and pale disc; but slight improvement of vision.

**Okayama** reports a retinal embolus at the macula of a woman, followed by pigmentary changes. These the author believed were due to serous separation at the fovea. **Rönne** has written on thrombosis of the central retinal vein, and **Kraupa-Runk-Teplitz** on embolism of central retinal artery.

Of *traumatic thrombosis* of the retina **Cozzoli** could find in the literature only the cases of Wiser and Weinbaum. His patient, an officer of 26 years, struck his left temple against a piece of furniture. Next day there was disturbance of vision of the left eye in the upper temporal quadrant of the field. Retinal arteries were reduced to fine threads; veins were wide from periphery towards disc, where they suddenly diminished in caliber. There were numerous hemorrhages, and vision 1/10. The second pulmonary sound accentuated; the radial hard. There was a trace of albumin in the urine; blood pressure 145. Diagnosis: Thrombosis of central retinal vein in lower nasal branch, in a subject with arteriosclerosis. Later areas of chorio-retinal degeneration developed. Subconjunctival saline injections were followed by subconjunctival hemorrhage in all places of injection. Vision ultimately became 1/20. Lues negative.

**RETINITIS IN PREGNANCY.**—According to **Chance** the retinitis of pregnancy is dependent upon the process that produces the acute nephritis, and is not to be considered to be albuminuric but is toxic. Chronic nephritis may be present before the pregnancy, or acute renal retinitis may develop during pregnancy. The nephritis of pregnancy is not a true inflammation, but a degeneration of renal epithelium. In some cases chronic nephritis may follow. Ophthalmoscopically neuro-retinitis with exudation and hemorrhage is seen. In eclamptic cases evidence of retinitis is rare. Prognosis is usually good, but dependent on the lesions and whether or not pregnancy can be terminated. The prognosis as to life is

much better than in nephritis of the nonpregnant. Spontaneous premature delivery shows 11% mortality; in artificial delivery the mortality is 4%. Early examination of the eyes of all pregnant women must be practiced, to reduce the mortality and to prevent affections of the eye.

**Kollock** relates the case of a mulatto woman with typical albuminuric retinitis of pregnancy who had no trouble in a subsequent pregnancy.

**RENAL RETINITIS.**—The retinal changes in chronic Bright's Disease, **Vandergrift** divides in two groups; one where exudation is the prominent symptom, and the other where arteriosclerosis is the main feature and retinal exudation is only slight. The exudation in the retina is an edema of the inner layers, mostly near the disc, and is similar to the dropsy in other parts. There is no inflammation and no degeneration. In retinal arteriosclerosis, on the other hand, small white spots are found in the macula and scattered about the retina. The macular arteries have a corkscrew appearance; veins are flattened by the crossing arteries; the light streak on the arteries may be wider; periarteritis and vascular obliteration follow; finally we meet spasm of arteries, embolism, hemorrhages, and optic atrophy. Embolism of the retinal vessels is frequently a forerunner of cerebral complications. The flame-shaped hemorrhages are an expression of severe toxemia, due to chemical changes in the blood and not in the vessel walls. Vandergrift emphasizes that the form of the retinal manifestation furnishes an index to the clinical type of the renal disease, and that the ophthalmoscopic examination is of inestimable diagnostic and prognostic value as to the kidney and the general circulation.

Among the patients affected with war nephritis **Evans** found changes in the fundus in 57%; involvement of optic nerve and retina in 39, and of the choroid in 34 cases. The affections of the optic nerve and retina were mostly slight. Only once was there neuro-retinitis of albuminuria, in a man of 56 years with chronic Bright's disease.



Fine dotted changes in the macula were seen in four cases. In 18 cases depigmentation was found near the equator, at times as yellowish streaks with slightly pigmented borders; 12 cases had discrete orange-colored spots, of the type of disseminated choroiditis; 2 showed areolar choroiditis of lues, and 5 had guttate changes in the macula. Five cases showed slaty slightly raised discolorations near the macula and the retina over them sheeny; these are suggestive of small choroidal hemorrhages or thrombosis. All changes point to a toxic or infective origin; they resemble changes found in advanced age. The nephritis is of the type which follows scarlet fever and it is possible that the changes are produced by infective elements. Lues was found in only two cases. Oral sepsis could not be blamed as the cause of the nephritis and the fundus lesions.

In spite of the rather severe type of trench nephritis in the soldiers examined by **Kirk**, no exudation or nerve involvement was seen at first. These showed up only later, the star-figure was always absent and hemorrhages not common; these were punctate and not flame-shaped. He could watch the absorption of some of the patches. **Kirk** believes these changes are due to a specific toxin and that the condition is probably allied to the retinitis of pregnancy, scarlatina, etc., and not to the retinitis of chronic nephritis.

**Machwitz** and **Rosenberg** believe that the albuminuria showing neuro-retinitis is caused by a renal affection leading to azotemia. It is a symptom of lesion of the glomeruli and when present means malignant sclerosis and that the patient cannot live over two years. The amaurosis of eclampsia is due to uremia and the eyegrounds are normal excepting for occasional edema of the discs. Prognosis is good and improvement follows lumbar puncture. In rare cases neuro-retinitis is present. The pseudouremic ocular disturbances oc-

cur only in kidney sclerosis, are extremely transitory and depend on arteriosclerosis of the cerebral arteries.

**Dolcet** also writes on renal retinitis.

**Erggelet** reports a case of polycythemia with nephritis and normal eyegrounds.

**TOXEMIA.**—**Jessop's** patient, a boy of nine years, suddenly lost the sight of his left eye; papilledema was found. Beneath the vessels was a large mass of yellowish white effusion extending downward to the periphery, upwards to the superior temporal vessels, and externally to 5 disc diameters from the optic disc; height of swelling 1.6 mm. Near the yellow spot was a raised white swelling with vessels over it. The heart, lungs and temperature were normal, no albumin or sugar in the urine. Lumbar puncture gave clear fluid, no pressure. Gradually the white areas in the macula were replaced by white spots. Though meningitis was in the same ward, the case was decidedly not one of meningitis.

**DIABETIC RETINITIS.**—Of 100 ocular affections of diabetes 19 to 23 are affections of the retina, according to **Lo Cascio**. Three forms are to be found: the punctate retinitis of **Hirschberg**; the hemorrhagic and the mixed form which is the most frequent. Whitish shiny foci in groups in the macula characterize the first form; at times the macula free with spots around; and only rarely a star-shaped figure. Differential diagnosis at times is difficult, because diabetes may be accompanied by nephritis; but vitreous hemorrhages are more frequent in diabetes and retinal vessels more affected in albuminuric retinitis. Small punctate, or large deep red hemorrhages from capillaries and veins, not arteries, are typical for the hemorrhagic form. Punctate hemorrhages at times, only accidentally are found. Hemorrhages into the vitreous are accompanied by severe disturbance of vision.

*(Continued next month)*

# DIGEST OF THE LITERATURE.

## THE RETINA

MARCUS FEINGOLD, M. D.

NEW ORLEANS, LA.

(Continued from June issue)

The mixed form is most frequent and shows white spots  $\frac{1}{4}$  to  $\frac{1}{2}$  disc diameter, never forming large spots as with albuminuria. Diabetic retinitis always arises in individuals suffering at some time from diabetes. The disturbance of vision may be the first symptom of the undiscovered diabetes; the cause of the retinitis being still unknown. Treatment of underlying conditions may be essential as with potassium iodid and sodium salicylat. Thrombosis of central vessels, and irido-choroiditis with glaucoma necessitating enucleation, may be caused by diabetes. In extreme lipemia of the retina the vessels appear whitish. Microscopic examination will show fat droplets in the retina and choroid.

As forms of diabetic retinitis **Shafer** distinguishes the punctate, the hemorrhagic, the mixed type, and lastly the albuminuric retinitis in the eyes of diabetics.

**Wootton's** patient, a man of 53 years, suffered from diabetes for 5 years. Failing vision of left eye for 5 months. At the disc a greyish white mass larger than the disc protruding 2 mm. into the vitreous; two small hemorrhages above. Left eye typical diabetic retinitis.

**DRUSEN.**—The left eye of **Waardenberg's** patient, a girl of 21, had poor sight for some years. The disc edges were indistinct. From the center of the disc a white tissue mass extended downward, covering part of the inferior temporal artery for a little more than one disc diameter. At the lower nasal border of the disc was seen an area about 4 to 5 disc diameters, china white, with non-pigmented margins. The surface was not elevated; but slightly uneven, as if due to small elevations and furrows between them. The field showed an absolute paracentral scotoma corresponding to the papillo-macular bundle and disc, larger

than the retinal focus. Von Pirquet and Wassermann reactions were negative. Later there was fresh swelling of the disc and retinal hemorrhages. Because the scotoma was larger than the retinal focus, because it extended to the macula, and because of the hemorrhages that later showed up in his case, **Waardenberg** feels that a retro- and intrabulbar neuritis had been present in his case; and that the "drusen" in the retina had by compressing the nerve elements further increased the field defect.

**ANGIOID STREAKS.**—Both eyes of **Heed's** patient, a boy of 18 years, showed a number of dark brownish streaks, branching freely and rising from pigment rings around the discs. There were no hemorrhages. **Wassermann** and tuberculosis reactions were negative. In the discussion **Zentmayer** favors the view of the vascular nature of the streaks.

**RETINITIS PIGMENTOSA.**—**Kirkpatrick's** 15 cases of retinitis pigmentosa were in a very large percentage of the cases the offspring of first cousin marriages. Twelve eyes were trephined. By this 5 were improved as to vision and night-blindness or both. Of the other 7 cases, 4 were blind before the operation.

**Sedwick's** case of pigmentary degeneration was in a man whose vision failed gradually. The fields were contracted and retina and choroid involved. In the discussion the opinions about the classification of the case were divided.

**Jones** believes that the disease is due to pluriglandular deficiency of the ductless glands, which may be impaired in varying degrees; and that in some of his patients 1 grain thyroid extract, three times a day, in connection with arsenic and strychnin has shown an arrest of the downward tendency of the disease.

**OTHER RETINAL DEGENERATION.**—**Agañaraz** reports the case of an Arabian, 20 years old, with high myopia. Family history and Wassermann were negative. Complaints began when ten years old. The retina shows two entirely different portions: the first one surrounds the staphyloma and the posterior pole, and is like a dark red blanket without any choroidal details. A margin of regular arches sharply separates it from the peripheral portion where the fundus is yellowish white, because of the entire atrophy of the choroid and retina. Here pigment in irregular form is abundant, and the choroidal vessels are seen as white cords. The field is concentrically contracted. Agañaraz considers his case as a variety of atypical pigmentary degeneration.

**STRIPED ATROPHY OF RETINA.**—In a normal eye **Ochi** found in the upper and lower parts long atrophic stripes behind the ora serrata and parallel to it. At these points the retina was adherent to choroid.

**Zentmayer's** patients, a sister and brother, 10 and 9 years respectively, presented an unusual type of familial retinal degeneration. Throughout the retina were white or yellowish disciform lesions, mostly discrete, in places confluent. The parents were not related, and there was indication of heredity. Wassermann and von Pirquet were negative.

Among workers in naphthalin **van der Hoeve** found four out of six presented evidences of retinochoroidal changes. **Ginestous** proved retinal lesions following antityphoid vaccination were merely coincident. **Stilwill** saw a boy with neuroretinitis probably due to accessory sinus disease.

**AMAUROTIC FAMILY IDIOCY.**—**Bernstein** believes consanguinity has nothing to do with the disease; because though first cousin marriages are frequent among Jews, idiocy and cerebral degeneracy are not characteristic of the race. In certain African tribes intermarriage is even more close. The degeneracy is due to the terrible economic conditions of the Jews in Russia

**Bernstein** reports two cases in the same family.

**Epstein** emphasizes that ophthalmoscopic examination is essential to proper diagnosis, and reports two cases in the same family. The parents are Russian Jews and first cousins. There was no lues, tuberculosis or alcohol in the causation. The children were the sixth and seventh in the family.

Amourotic family idiocy is a recessive condition, **Brandeis** maintains, and for this reason, given the consanguinity of the parents, it is a reasonable Mendelian expectation that the two patients of Epstein should have been the only children in the family to show the disease.

**Rand** saw two cases, children of Russian Jews, the parents in neither case being related. The one is, possibly one of three children with the same disease in one family; the other one, over one year old, is still living, but has failed rapidly in the last three months.

**Welt-Kakels** reports of an infant of about eleven months with the usual picture. The spinal fluid of the patient was injected into an animal; and brain and spinal cord thereof examined showed no changes.

**Leonard** reports two cases: 1. A boy 17 months old, of Jewish parents, the second child; parents not related; pupils reacted and there was no fundus examination. 2. A girl, 15 months old, of Jewish parents, apparently not related. The fundus was typical.

**McHenry** reports nine cases, all of Jewish parents, that were not related, excepting in one instance where the grandmothers were third cousins. All cases showed negative Wassermanns. He believes that many cases are not reported or diagnosed.

**Tyrell's** patient, a child of 9 years, with negative history, showed a small circular area of densely powdered pigment in each macula, surrounded by a ring of scattered pigment spots; discs pale. Normal mentality. No change during 1½ year's observation.

**SOLAR RETINITIS AND SCOTOMA.**—**Lundsgaard** reports the good results of warnings sent out by the Ophthalmological Society of Copenhagen not to



observe the eclipse of the sun with unprotected eye. After the eclipse of 1913, 143 cases of scotoma were collected. In consequence of the warnings appearing in all the newspapers before the eclipse of 1914, only one case was reported and that in a man who had never read a paper.

**DAZZLING.**—**Holloway's** patient, a lieutenant, complained of eyes painful, injected and lids burning. After correction of the compound astigmatism and after discontinuing aviation work discomforts continued. The patient resumed his aviation duties in the fall and was comfortable with amber glasses. No perimetric examination was made.

**LESIONS OF THE MACULA.**—**Chance's** case of *hole at the macula* after explosion, showed a number of hemorrhagic areas, diffuse edema of the retina and a circular pigmented area 2 disc diameters were found below the hole.

**Burkholder** reports a case of a negro soldier, 27 years old, who received a blow on the right eye when a boy. In the macula was a hole, slightly larger than the disc, with sharply marked pigmented margins and deep red, mottled floor; with a few crystals of cholesterin on the floor; and central scotoma. **Mack's** patient with hole in the macula was struck in the right eye with a cork six years before.

**Ischreyt** reports the case of a woman of 74 years whose left macula was encircled by a ring-shaped detachment of the retina. Retinal vessels apparently do not cross this area. The choroidal vessels were sclerotic. It was impossible to decide whether the retina was totally detached at this place, or if there was only cystic detachment of certain layers. Possibly the cause was thin exudate. **Masuda** has reported a case of central chorio-retinitis.

**RETINO-CHOROIDITIS JUXTAPAPILLARIS (JENSEN).**—**Puiggari's** three cases showed stationary, typical, absolute scotoma, the result of infiltration close to the disc. Syphilis and tuberculosis do not seem to be causative factors.

**Martin's** patient, aged 19, noticed suddenly nebulous vision of the left eye. An infiltration like a mound of

white snow at the upper outer quadrant of the disk partly obscured the vessels. The typical scotoma was present with normal central vision. Soon a stellate hemorrhage appeared around the cherry-red macula. Hemorrhages disappeared after three days; vitreous opacities persisted longer. Finally: scotoma extending from the atrophied area to the periphery and greatly reduced central vision. Anemia, tuberculosis, malaria and lues negative. **Martin** emphasizes the importance of field examination and that the possibility of focal infection must be considered.

**REVERSE SEEING.**—**Bargy** relates the statement of a young woman that, while studying for examination and reading at night with poor illumination, she experienced repeated attacks of seeing all letters reversed. These attacks never returned after examination. The patient was looked upon as not being well-balanced and later had hysteriform attacks. In connection with this he quotes from the Memoirs of George Sand: "My vision was so used by the night watches that I saw all objects reversed and especially these rows of bridges which presented themselves before me as arches turned over on their bases."

**VON HIPPEL'S DISEASE.**—**Okayama** reports the second case in Japan, in a man 24 years old. In the left eye was an intensive whitish grey exudate with detachment of the retina on which ran bizarre retinal vessels in an irregular manner; and in one spot a reddish ball. The right eye, though still having good vision, showed in the region of the papilla a dark red conglomeration of vessels, and in the equatorial region similar large roundish formations. Arteries and veins entered into the formation of these masses, but were different in size and color. White spots appeared in various places.

The patient of **Ischreyt** noticed dark spots before his eye. This **Ischreyt** explains as due to a sudden impediment in the arterial current, by the retinal glious new-formation. With the compensatory arteries the disturbance gradually subsided. Improvement was not lasting because of fresh vitreous

opacities. The intense ectasia of the vein was possibly due to thrombosis at the papillary end.

**RETINAL DEGENERATION WITH ANEURYSMS.**—**Abe** and **Sugumuma** report a case of degeneration of the retina with multiple aneurysms in a 16 year old girl. In the left macula and at the periphery were large white spots of degeneration, and irregularly distributed aneurysms. Cause unknown. **Pringle's** case of multiple aneurysms of retinal arteries, without retinal degeneration, has been referred to, p. 102.

**Jenning's** patient, a man 21 years old, had defective vision of the left eye for two months. The macula showed brilliant white dots, spots and lines in a circle; and on the temporal side of it in a semicircle suggesting albuminuric retinitis or retinitis circinata. Retinal veins suddenly widen some distance from the disc. Eighteen aneurysms are seen on the different arteries. The larger aneurysms have a bright central reflex. No appreciable changes in three months. The condition is considered the result of local inflammation and degeneration of the retinal vessels of obscure origin.

**RETINAL PERIPHLEBITIS.**—**Okabe**—Not available.

**RETINO-CHOROIDITIS.**—**Lewis** reports a case of retino-choroiditis in a woman of 51 years.

**Haab's** observations were previously noticed (*Y. B.*, v. 13, p. 200).

**GUNN'S DOTS.**—The changes in the retina known as **Gunn's** or **Crick Dots** appearing as minute yellowish shiny dots, mostly on the nasal side of the disc, lying in front of the retinal vessels and best seen near the image of the ophthalmoscopic flame on the retina, have apparently been misunderstood, judging from most descriptions of them in important textbooks, according to the Editor of the *British Journal of Ophthalmology*. **Paton** explains it by the fact that they must be viewed with a plain mirror and a solid flame. According to his experience they are found in a large number of cases complaining of intolerance of glare, with only insignificant errors of refraction.

**MONGOLIAN IDIOCY.**—**Wood** has found no retino-choroidal and optic nerve changes in Mongolian idiocy.

**SPASTIC PARALYSIS.**—**Kearney** emphasizes the importance of eye-ground examination in infants after difficult delivery. Intraocular hemorrhage at birth is responsible for 70% of spastic paralysees. Blurring of upper and lower margins of the discs or papilledema may result. Early diagnosis and operation give the best results.

**HEMERALOPIA.**—Different affections having been placed together under the name of War Hemeralopia. **Wessely** insists that it is necessary to get uniformity of examination, especially in the method of the examination of adaptation. "Such methods must permit a continuous measuring of the source of adaptation, and must permit the simultaneous observation, under the same external conditions, of a person of normal adaptation. For this purpose **Wessely** constructed a simple adaptometer. Of 120 soldiers, not wearing glasses, a little over 80% had normal adaptation, about 15% had one half the normal, and 3% had even a lower adaptation. Errors of refraction make conditions considerably more unfavorable, myopia playing the principal role.

All these cases of "physiologic inferiority" are characterized by the fact that the disturbance of adaptation is least noticeable on transition from strong light-adaptation into dark, and that the difference compared with the normal remains relatively the same in the further course. The liminal values are rarely raised, and a divergence of the curves, typical of true hemeralopia, never occurs. Even the **Purkinje** phenomenon retains the same relative value compared to the normal. Not only the test for white, but also the use of blue and red lights are often needed as diagnostic aids to distinguish the true hemeralopes from those of only raised liminal value.

Critical examination diminishes the number of cases of true war hemeralopia. Some cases show only slightly diminished adaptation and some even normal adaptation; some of these cases



must be looked upon as neurasthenic autosuggestion. The question is still open whether raised liminal value can be acquired. The number of cases supposedly due to absence of certain substances from the food, and to physical and mental exhaustion, become smaller the more careful the examination.

In Toulouse, **Frenkel** found the cases of hemeralopia the most numerous in myopes. He divides hemeralopes into major and minor hemeralopes, according to the number of meter candles necessary to recognize the marks of the photometer. Minor hemeralopia is more prevalent in lower grades of myopia, and in individuals with hemeralopia that are not myopic. Major hemeralopia is more frequent in high grades of myopia and in certain ocular affections even aside from the pigmentary degeneration of the retina. The photometer of Foerster can be used to detect stimulated hemeralopia, because repeated examinations will give figures that show variations within certain limits only in individuals acting in good faith.

In a very readable paper explaining the several conditions influencing seeing at night, **Landolt** separates those who suffer from night blindness since before the war from those who have the disease as a result of the war. Among this latter is a group of cases of, as he calls it, nocturnal amblyopia or false hemeralopia, found in individuals with uncorrected ametropia and those having corneal lesions. The other group, the true hemeralopes, comprises cases with chorio-retinal lesions, retinitis pigmentosa, choroiditis, congenital affection of the neuro-retinal system and congenital night blindness. In the first group the infirmity may be corrected by glasses and the men kept at the front. In the second group, the individuals may be put into auxiliary military service; most of them may be kept at the front, but care must be taken to notify the commander of their condition. Cases rendered night-blind as a result of the war are very rare and the condition should be easily cured by rest, diet, eggs, cod liver oil and iodid of potassium, etc.

**Braunschweig** has written on examination of light sense and **Mosso** on hemeralopia.

Of one hundred and forty cases of hemeralopia examined by **Birch-Hirschfeld**, one hundred and eight had suffered from this condition before the war, but the condition had been aggravated during service. In thirty-two of the cases the condition had become noticeable during service; in nine cases there was loss of blood; in five gastrointestinal disturbance had formed a certain causal factor. These cases offered a good prognosis. Sixty cases were in myopes, of which twenty-six were of more than six diopters. The field for blue was especially restricted in these latter cases.

For the distinction of the real from the simulated night-blind, **Feilchenfeld** places the patient in a dark chamber for one hour and then tests the pupillary reaction to weak light stimuli. With the true night-blind the reaction is almost as sluggish as before the dark room period, but the reaction of the pupil is more lively than before in the normal individual.

Exact measurement of the threshold stimuli, according to **Crzellitzer** is necessary for the exact study of hemeralopia. As a unit he recommends the "mikrolux," the millionth part of the normal candle. His adaptometer permits plotting of the whole adaptation curve, but it is sufficient for the diagnosis to have threshold value after a thirty minute dark adaptation. This ought to be with the normal 15 to 20 mikrolux. He who has more than 80 to 100 mikrolux is actually night blind and is unfit for field duty.

Owing to the difficulty in getting reliable examination of the dark adaptation in cases of hemeralopia in the field, **Jess** recommends careful taking of the field of vision, especially with colors; since field disturbances are a constant symptom in hemeralopia. In order to recognize the beginning contraction of the blue-yellow, in comparison with red-green limits, it is necessary to watch carefully the limit of yellow. This will, with the ordinary colors employed, show a contraction, as



first pointed out by Krienes, when one cannot yet be discovered with any blue. Of 61 "night-blind" soldiers of all arms, 35 showed field disturbance verifying the diagnosis of hemeralopia. Of the other 26, 6 were so-called dioptric hemeralopias, 18 without any disturbance of adaptation when examined with a photoptometer, and only 2 showed no field anomalies in spite of distinct disturbance of adaptation. Exact histories and long observation proved the hemeralopias to be congenital or acquired before the war. Only 8 times did the hemeralopia originate during the war, and then it was possibly due to disturbance of nutrition or exhaustion.

In examining with the light dial, **Loehlein** recommends that the results be compared with the results of the examination of individuals known to have normal adaptation, and that glasses are to be placed on the normal individual to reduce his vision to that of the patient examined. Of the so-called night-blind not all are really hemeralopic. In many the complaints are due to nerve exhaustion, arteriosclerosis, alcohol, tobacco and other causes. In some cases of real hemeralopia the patient was not actually aware of the defect, and discovered the trouble early in the war. Real hemeralopia rarely develops at the front, and then an ocular or general disease was present. It is necessary to determine the cause of the disturbance in each individual case. In the rare cases of acquired hemeralopia the removal of the primary disease is necessary. Patients affected with a high degree of this condition can be used in only very special occupations relating to the war; moderate cases when used at the front, should not be put on night duty, driving, etc.

According to **Junius** hemeralopia with fundus changes is rare; it is nearly always an old condition becoming manifest under war conditions. Reliable observers admit of it originating during the war, but it is very rare. Errors of refraction, especially high myopia, play an important part. No man should be discharged from the army when he can still render some service even if he

presents a diminution of the light sense. On the other hand one ought not to hesitate to discharge a man with sufficient visual acuity during the day if he is unable, according to the report of his superior, to discharge all duties at night. One can hardly expect improvement or cure of the hemeralopia by treatment or exercise. In doubtful cases treatment ought to be tried. The method of examining the field is still to be improved; the Birch-Hirschfeld adaptometer is desirable. Compensation by the state is to be given only to him who has actually acquired undoubted invalidism in consequence of the war.

While disturbance of vision at night is fairly frequent at the front, **Aubaret** finds the number of cases of true hemeralopia relatively small, and that hemeralopia appears in several forms according to the site of insufficient adaptation: pupillary (fairly frequent), retinal or cerebral. Insufficient pupillary adaptation is amenable to treatment. Dark glasses worn during the daytime are of service in retinal and cerebral faulty adaptation. Improvement of general physical condition, rest and tonics are necessary.

**Gelencser** found that the disturbances following limited diet and the constant absence of certain food products (vitamins) could be improved and cured in several cases when he, on the suggestion of Arnstein, added to the mixed diet doses of calcium lactat 0.5 gr. three to five times daily. One must not forget that the war hemeralopia is mostly found in worn out and nerve exhausted individuals. **Elschnig** thinks a large part of those suffering with hemeralopia are neurasthenics and convey the psychic infection to a whole battalion; and at times they are malingerers. Repeated examinations of the threshold of stimuli, after different adaptations, should the figures not tally, will detect malingering.

**El-Rasheed** reviewing 52 cases seen in Egypt classifies night blindness as follows: Retinitis pigmentosa with and without pigment changes; congenital hemeralopia; myopia, liver disease, diarrhea, malnutrition combined with

the effect of glare and other causes. This latter group also contains the cases of periodic hemeralopia. He gives examples of different groups and the differential diagnosis. Affections of the liver cause night blindness without noticeable signs in the fundus. Keeping bowels open and regulation of the diet, with the addition of roasted liver to the meals, is employed in mild cases. In more serious ones the prognosis depends on the underlying condition. In early cases due to malnutrition cod liver oil, liver feeding and the use of black glasses will result in speedy cures. One of his patients showed periodic attacks of night blindness coming on in summer during the Nile flood. The duration of the night blindness in that particular case was diminished in each succeeding attack. Nothing abnormal was found in the abdomen. Night blindness is a condition requiring careful investigation in order to arrive at a concise analysis of the cause and thereby to an appropriate means of cure.

**Dehogues** reports ten cases of hemeralopia in charcoal burners in Cuba. Examination of the blood was made in order to establish whether inhalation of carbon monoxide was the cause of the condition. In every instance noticeable reduction in the hemoglobin was present, together with other characteristics produced by the carbon monoxide poison. After treatment with tonics for two weeks, the blood showed a return to the normal while the hemeralopia had entirely disappeared.

**DETACHMENT OF THE RETINA.**—The Committee of the Ophthalmological Society of the United Kingdom (Proc. v. 36, p. 352) reports a review of 85 collected cases of cures of detachment. Of these 44 cures occurred after operation. Operation has been successful in myopia, traumatism, cataract extraction and idiopathic, even after two years duration. The youngest individual was 15 years, the oldest 78 years. It occurs in spite of vitreous opacities. In none of the cases was retinal rupture or hole present. Scleral puncture with knife or cautery was most beneficial. Intra-

vitreous injections are of no benefit as to visual acuity; perfect function may result but reattachment with poor function may occur. Spontaneous cure occurs in myopia, traumatism, pregnancy, idiopathic cases even after detachment of over two years' standing. Spontaneous cures have occurred in spite of the tears of the retina. (c) Non-operative treatment is most efficacious. Especially rest in bed and the pressure bandage. In albuminuric cases recovery occurs after rest in bed alone.

Treatment by electrolysis for retinal separation is proposed by **Verhoeff**. The retina is first replaced by means of scleral puncture, and the patient kept in bed for one week. Under cocain anesthesia a large number of minute punctures through the sclera and retina are now made. Small half-curved needles are used for each puncture, and the current from six dry batteries of  $1\frac{1}{2}$  volts each is employed for about five seconds. The positive electrode is applied to the cheek. The punctures are made directly through the conjunctiva, the needle protruding into the vitreous only one or two millimeters. The patient is kept in bed for about ten days. A case is reported of a woman of 43 years with separation of six years' standing in which complete reattachment occurred with partial recovery of function.

In five cases of trephining for detachment in four patients, **Green** had four failures and one success; but a success that may at any time be converted into a failure, the operation on the other eye of the same patient having proved a failure. The four failures were all in old detachments. The one successful case was operated on within three days after occurrence of the detachment. It is, therefore, more rational to operate soon after the onset of the detachment than to temporize with nonsurgical methods.

**Curtin's** patient, (Y B. v. 12, p. 204, and v. 13, p. 218), has still normal vision and field and the retina is still in place three years after the operation. Curtin reports another case in a man of 62 years with flat detachment in the entire lower half. Three weeks after



trephining and aspirating of a yellow fluid, the retina was in place, with vision 20/100. Detachment of the retina in **Chance's** patient, a boy of 5 years, was in the lower half and quite translucent. There was no evidence of inflammation, but a whisp of vessels extended in the cornea from the upper limbus. The previously normal tension was increased of late.

With Blaskovics, **Toereck** classifies detachments into two main groups: Disproportion between the contents of the eyeball and its coats, and the other where the disproportion does not exist. To the first group belong shrinking of the vitreous from various causes; and those cases where extension of the sclera is the cause, as in myopia. To the second group belong the detachments after exudates of all forms. The prognosis and treatment depend wholly on the cause; only in cases belonging to the second group can cure be expected. Two cases illustrate the points. A woman of 49 years had a detachment, due to arteriosclerosis, which spontaneously disappeared for a while, to reappear later and also to appear in the other eye. In the other case, a man of 30 years, lost his right eye from detachment years ago. The left eye showed old and recent choroidal patches, which reacted positively to tuberculin, and also some small areas of detachment. Under tuberculin treatment the choroidal patches became absorbed and the retina reattached.

In the first group the prognosis is less favorable. Mueller's operation tries to relieve the disproportion by excising a piece of the sclera and, as modified by Blaskovics, is as follows: After extensive canthotomy under anesthesia, the conjunctiva is dissected up and the external rectus severed between two sutures. In the sclera thus exposed an oval space about 20x10 mm. is outlined with a scalpel. The incision extends through half the thickness of the sclera and the superficial layers are removed. Five double-armed sutures are now inserted; and the posterior part of the incision carried through the whole thickness of the

sclera, the choroid to be avoided. The choroid is separated from the sclera, then punctured. The sutures are drawn together and the scleral flap is pushed into the pocket between sclera and choroid. The sutures in the externus are tied and the conjunctival wound closed. Both eyes are bandaged and the patient remains in bed eight days. Toereck has operated eleven times and had no permanent results in his first six cases. In the latter five cases he increased the size of the scleral flap and the results are more promising. Short histories of these cases are given.

**Schiötz** reports the results after the preequatorial sclerectomy of Holth in 21 cases of detachment. On discharge 5 were improved, 9 unchanged and 6 worse. After nine months to 2½ years, 3 were improved, 5 unchanged and 11 worse. **Grönholm** has written on pre-equatorial sclerectomy in detachment of retina. According to **Holth** spontaneous cure of detachment is so rare that it need not be considered in the estimation of the results of operation.

**Peyrecave** succeeded in curing five cases of myopic detachment by rest in bed; and subconjunctival injections, twice weekly, of gelatin in 20% saline solution. The detachment in **Blake's** patient began two years before, following an injury. After trephining gradual improvement continued during ten months. Vision ultimately rose to 20/200, with normal field. **Hughes'** patient with detachment of the retina was struck by piece of iron two weeks before. The detachment was elevated about 7 D. and in the discussion the diagnosis of sarcoma of the choroid was suggested. In **Garraghan's** case of detachment, in the shape of a plaited funnel, the blindness of the right eye was discovered two months before. There had been no injury, no pain.

Detachment at the ora serrata is reported by **Lawson** in a man near whom a bomb burst five months before. The pupil was wide, vitreous hazy and a diagnosis of severe contusion was made. Vision improved to 6/9. Later sudden diminution of vision occurred, the pupil was small with veil-like de-



tachment close to the lens. Foreign body in the globe was now suspected, owing to the irritation of the eye and changes in the pupil. This was verified by a skiagraph. Later the retina greatly reattached, and a shiny foreign body could be seen. Gradually the eye became irritable, and enucleation was performed. The pathologic examination by **Collins** showed the retina at the ora serrata torn away from the ciliary body. The foreign body must have entered the upper and outer part of the

globe, passed through behind the lens to the ciliary region on the opposite side; and contraction of the vitreous was the cause of dragging towards the center of the globe, of the retina in the region of the ora serrata.

The right eye of **Wootton's** patient presented a flat, wavy membrane resembling a retina that had been torn from the ora serrata, extending from above downward, on the temporal side. The mass was possibly one of proliferating retinitis.

## TOXIC AMBLYOPIAS.

DELAMERE F. HARBRIDGE, M. D.

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This section includes the literature from January, 1917, to May, 1918. But some instances of the harmful action of certain substances may be found under "Therapeutics," or under "Injuries." See also "Optic Nerve."

**QUININ AMBLYOPIA.**—**Ballantyne** presents a very complete analysis of the various theories and experiments, which have been offered in explanation of the production of quinin amaurosis. A good reference list follows. The author first details a typical case, followed by the case history of one of his patients, pointing out wherein it differed; in that, altho the patient was first seen four days after the administration of the quinin, blindness ensuing, a further period of five days elapsed before the characteristic ischemia of the disc and retinal vessels made its appearance. The paper is summarized as follows:

appearance sooner or later; but that there is no correspondence between the character or severity of these changes, and the intensity of the visual defect.

3. That the visual defect cannot, therefore, be due to such changes, but rather to a condition of the retinal elements invisible with the ophthalmoscope.

4. That this change may be induced, or aggravated, in the first place, by ischemia due to contraction of the vessels of the optic nerve and retina; but that it is, in the main, the result of a direct toxic action of quinin upon the retina itself, and that the ultimate recovery of central vision, with loss of peripheral vision, and failure of vision in twilight, suggests a selective action of the poison upon the rods.

**Santos Fernandez** directs attention to the disturbance of vision from quinin and paludism, as possibly being a hybrid affection. He notes, especially, cases of sudden blindness, following the exhibition of quinin for several malarial attacks. The anatomic basis is apparently total ischemia of the papilla, followed by atrophy of the optic

1. That in quinin poisoning, complete loss of vision may be found, in association with a normal condition of the fundus oculi; and that there may be a striking recovery of vision, in spite of the presence of well marked fundus changes.

2. That in all, or nearly all, cases of quinin amaurosis, ophthalmoscopic changes, such as congestion of optic nerve and retina, pallor of the disc, narrowness of the retinal vessels, and cloudy opacity of the retina, make their

nerve. In such cases, the drug is naturally accused, but it is, of course, not impossible that the disease was an active factor. Does quinin ever set up this ischemia in the subject, and does its action on the plasmodium react unfavorably on the organism? It is highly important to ascertain the special affections of the eye, which result from paludism alone, and from quinin alone.

Quinin, without reference to any particular therapeutic use, is commonly accused of causing "amblyopia" and "amaurosis," which names suggest functional disturbances of temporary duration. It is conceded, however, that it is not so much heavy dosage, as idiosyncrasy, which is responsible for quinin amblyopia, etc. The entire question remains unsettled, because of lack of autopsy material, and because we are influenced, necessarily, by results of experimental work on animals; which appear to show that quinin is surely neotropic to the optic nerve, if the dose is large enough.

A soldier, aged 20 years, received by mistake, 40 grams of sulphat of quinin, instead of sulphat of magnesia. In half an hour, he lost consciousness. When he recovered, he could neither hear nor see. Examination by **Galiana** showed pale papillae, muddy edges, contracted vessels, fingers at 2 M. About three weeks later, when last seen, vision had greatly improved, but fields remained contracted. This is the only case of amblyopia by intoxication, observed by Dr. Marquez, in the Buen Suceso Hospital, among 34,000 patients seen in fourteen years.

**ETHYLHYDROCUPREIN AMBLYOPIA.**—A lady, aged 40 years, to whom 4 grams of ethylhydrocuprein in 0.20 gram doses, every two hours, was administered for pneumonia, developed tinnitus, later complete deafness, and just before the last dose, total amaurosis. **Lorant** observed the pupils moderately dilated and fixed, papillae pale, contracted vessels, arterial pulse on pressure on globe, and in the left eye, small, circumscribed hemorrhages.

**Schreiber** reports three cases of visual disturbance, due to internal use of

ethylhydrocuprein. A doctor, aged 54 years, ill with pneumonia, received four 0.3 gram doses of quinin hydrochlorid, fourteen 0.25 gram doses of ethylhydrocuprein and one tablet of digipuratum, three times daily. On the fifth or sixth day, amaurosis developed, which disappeared in ten hours. Two months later night blindness developed. There was no optic atrophy, altho the blood vessels were narrowed. The second patient was a woman, aged 57 years, who had received 1.75 grams of ethylhydrocuprein. Optic atrophy, narrow vessels, good visual acuity, but narrow fields ensued. The third patient, a woman, ill with pneumonia, showed conditions as found in the second patient.

**Schiötz** reviews, in detail, ethylhydrocuprein and its drawbacks. He also reports a case of transient blindness, in a sailor, aged 48 years. While the vision is reduced, it was not enough so to incapacitate him. He was color blind, and had restricted fields. **Van der Hoeve** and **Mansholt** report of a patient with pneumonia, on an exclusive milk diet, who was given, in moderate doses, a total of 4 grams of optochin. He became totally blind. Vision partially returned, but with paralysis of accommodation, atrophy of the optic disc, and sclerotic changes in the vessels. The vascular changes did not develop until several weeks after the first symptoms, but they continued a progressive course, while the nerve changes seemed to show a tendency to retrogress.

Out of thirty cases of pneumonia, in which ethylhydrocuprein had been given, **Pollnow** saw no after effects in 25 cases, but disturbances of sight and hearing in 5 cases. In 2 cases, there were slight, quickly transient, visual disturbances; in one, tinnitus of the ears, and two, serious troubles in the eye. Both of the last were quite blind at first. One patient later regained approximately normal conditions, but only a very slight improvement was obtained in the other. They received 0.25 grams of ethylhydrocuprein every four hours.

In the latter case, amaurosis set in on the third day, and gradually began to improve after several days. Now, both papillae are very pale, the vessels tortuous, the arteries very small, some obliterated, some with white sheathes. The retinas were edematous over a large area about the papilla, with a red spot in the fovea. Vision of each eye, fingers at from 1 to  $1\frac{1}{2}$  meters. Visual fields were concentrically contracted to a high degree. Blue and red are the only colors recognized of large objects. Diagnosis, neuritic atrophy, secondary to disease of the optic nerve, and retina, with edema and vascular disease.

In the other case, the symptoms and the changes in the fundus are similar, but the vision has improved to  $\frac{4}{4}$ . It appeared to the writer to be a typical quinin poisoning, in which probably, circulatory disturbances play the chief part. On account of the greatly varying susceptibility to quinin, ethylhydrocuprein should be given in very careful doses.

**Feilchenfeld** observed a man, aged 20 years, who was given 5 grams of ethylhydrocuprein in the course of thirty hours, for a beginning pneumonia. After one day, there was loss of hearing, and a day later, poor vision, which within another twenty-four hours had become almost complete blindness. Both symptoms receded, under the employment of large doses of sodium iodid, and tincture of strophanthus, but at the end of two months, there was a permanent injury, manifested by hemeralopia, flickering before the eyes, annoying subjective scotoma, concentric narrowing of the visual field, and of color sensation in both eyes. The employment of ethylhydrocuprein, internally, should, therefore, begin with smaller doses; and since the disturbances of hearing always appear first, their occurrence should always be the signal for immediate cessation of the drug.

**NITROPHENOL AMBLYOPIA.**—Three observations are published by **Sollier** and **Jousset** of soldiers, employed in the use of nitrophenol in the manufacture of high explosives. All suffered

from symptoms closely allied to those of a chronic retrobulbar neuritis. The first had early paralysis of the brachial plexus with a slow atrophy of the deltoid. The ophthalmic examination gave a visual acuity of  $\frac{5}{10}$ , accommodation paralysis, green blindness and a concentrically contracted field. There was slight edema of the nerve head.

The second case had anesthesia and paralysis in both feet. Acuity of  $\frac{2}{10}$ , with central scotomata for green and yellow, and contracted field and accommodation paralysis, with normal pupils. The third had a bilateral papillitis, with acuity of  $\frac{1}{20}$ , in the right eye, and  $\frac{3}{10}$ , in the left.

The authors have fifteen analogous cases, but cannot trace the point of entrance of the poison. Perhaps the nitrites, being vasodilators, might be counteracted by the use of a vasoconstrictor. It is well to warn the workers, so that they may be on their guard, and have them use masks, gloves, and hand disinfection. At the first symptoms, the worker should be sent to a specialist, who will decide upon the advisability of giving up the position in the powder industry.

**PAINT AMBLYOPIA.**—**Besenbauch** alludes to the frequency of untoward effects of the volatile principles in paints, as experienced by painters. He relates a case in which the nature of the fumes was obscure. The patient suffered an acute hallucinatory confusion and optic neuritis. Benzol could be excluded, but the manufacturers admitted the use of a distillate of Borneo petroleum known as sanzazol. This statement was confirmed by an analysis. The toxic substance was also identified as putrol, a substitute for turpentine, known for its disagreeable odor. The paint, a light green, was used on ships, especially for decorating small spaces, in which ventilation was poor. Numerous cases of poisoning had been reported, and a single case is given in detail. The victim made an uneventful recovery. To prevent such accidents, painters are warned not to converse, whistle, etc., while painting. The greatest possible ventilation should be secured, a portable ventilator being



available. The shift should be only three hours long, with an hour's intermission, to be spent on deck. The paint, pronounced relatively nontoxic, was not condemned.

**WOOD ALCOHOL AMBLYOPIA.**—There was no demonstrable ophthalmoscopic cause in **Risley's** patient, who doubtless suffered with a sudden blindness, due to wood alcohol. A young Italian, with his friends, was in the habit of using a beverage made of alcohol, water, sugar, and "orsa rossa." The nature of the latter was not ascertained. **Golovin** has written, regarding blindness after the use of wood alcohol, and the other substitutes for vodka.

A male, aged 33 years, presented by **Strickler**, may have suffered a toxic amblyopia, due to tobacco or alcohol, although the history and findings were not conclusive. Vision was reduced to counting fingers at three feet, color sense fair for green, red or blue. There was no true scotoma. The temporal side of the disc was pale, the nasal side appeared swollen.

**LEAD AMBLYOPIA.**—Five or six months previous to consulting **Leoz**, a mining engineer noticed weakness in his sight, which increased until he had to give up his work. On clear, sunny days he was unable to see where he was going. Distant vision was rather better than near, a dark spot and a halo somewhat less dark, obscuring close objects. Luetic, alcoholic and tobacco history was negative. The paralysis of the extensors of the fingers confirmed the diagnosis of saturnine amblyopia. The fundi were slightly congested, and the papillae of a reddish color. Definite scotomata were observed. Following the use of iodides, laxatives, and sulphur baths, a cure was effected within two years. For practical reasons the author advises scientifically studying the special causes of toxic amblyopias. If lead intoxication provokes a nephritis, and this in turn a retinitis, the amblyopia would be albuminuric and nothing more.

## THE OPTIC NERVE.

CHARLES P. SMALL, M. D.

CHICAGO.

This review covers the literature relating to the optic nerve from January, 1917, to May, 1918.

**ANATOMY AND HISTOLOGY.**—Impressed by the variety to be observed in the amount of *cupping* in cases of glaucoma, **Fuchs** has written an exhaustive paper accompanied with forty-eight drawings and microphotographs, to show that the difference might be largely due to variation in the anatomy of the lamina cribrosa. He says that the picture of excavation is first formed by the weakening and subsequent disappearance of the glial trabeculae. The connective tissue trabeculae follow later. If this occurs early, cupping is deep, while there is still good sight and but little alteration in

the nerve head. If, however, it occurs late, then, while the cupping remains shallow, and is mainly due to atrophy of the nerve, the sight rapidly diminishes. He concludes that the usual process in raised pressure consists in a sclerosis and thickening of the lamina, probably as a result of the greater load it has to bear. This may either remain as a permanent change, or resorption may follow under the continued pressure.

That *hemorrhage* into the optic nerve sheath, vitreous, and retina not infrequently follows fracture of the skull is evident from the review of the litera-

ture. How frequently this condition occurs in cases of spontaneous intrameningeal hemorrhage is uncertain. One such case is recorded by **Doubler** and **Marlow** in a negress about 32 years old. She was suddenly seized, while at work, with vomiting, and fainted. The vomiting soon ceased, but her blood pressure swiftly rose until it was 300 and could not be recorded, and she died in about six hours after the attack.

In the autopsy the interesting findings in this connection showed chocolate brown masses of clot completely overlying the papilla, extending in an irregular manner into the vitreous. The macular area was clear; the peripheral retina contained a few small hemorrhages. The hemorrhage on the papilla appeared to be a direct extension from within the nerve sheath. It is of interest to note that intracranial pressure great enough to force blood into the sheaths of the optic nerves, and apparently through the lamina cribrosa, should not produce a papillitis and choked disc.

**ANOMALIES.**—**Zentmayer** presented a case of congenital anomaly of the optic nerve and choroid in a woman 35 years of age, whose vision had always been defective. (See p. 60.) In the right eye there were two large wing-shaped areas of defective choroid which spread out from the optic nerve to the temporal and nasal parts of the fundus. The defect in the choroid was complete. The papilla was oval and presented at the scleral ring on the temporal side a porus opticus thru which the retinal vessels emerged. The eye was myopic 8 D. In the left eye, which was myopic 3 D., the choroidal defect was much less extensive and not complete, the choroidal vessels being present and showing sclerosis in places. The right eye was divergent; but this had been almost corrected by an O'Connor advancement of the internal rectus.

**Menacho** exhibited an interesting case of *opaque optic nerve fibers*. Beginning at the disc, they covered a rhomboid area about twenty-two times as large as the disc, and extending slightly to the nasal side of the disc

above and below, about three-fourths of the expanse being above the level of the disc. From a point about midway between the temporal edge of the disc and the macula, in the expanse of fibers running horizontally, there was a dehiscence to the temporal edge of the opaque area, and measuring vertically about a half disc diameter. The macula had undergone extensive destruction, showing areas of white sclera and localized deposits of pigment.

**Buchanan** reports a case of congenital anomaly of optic nerve fibers, which is very unusual. The course of the fibers was between the retina and the hexagon pigment layer; not, as is usual, in the anterior layer of the retina. The eye had been excised because of an injury. A very small, nearly white band of fibers was seen in the optic nerve at its temporal side. It was at once noted, however, that the band of medullated fibers passed sharply round the edge of the choroid and lay between the retina proper and the hexagon pigment layer. The nerve itself seemed to have a notably oblique position in the sclera, and the abnormal band of fibers took a peculiar double curve round the edge of the choroid. As the lamina of Bruch was present in all sections up to the edge of the nerve head, it is to be supposed that there was no coloboma of the choroid or optic nerve.

**Collins** presented a man, 57 years of age, on whose left optic disc, and nearly confined to its area, are several small, and remarkably *tortuous* veins. Those on the temporal side extend for a short distance beyond its margin into the retina. In the skin of the patient's left lower lid are two small, widely separated, *vascular nevi*. In the skin of the left temporal region there is a large, mottled, capillary nevus. The patient has, since a boy, been liable to bleeding from the nose when he blows it, and the blood comes mostly from the left nostril. On examination of the nose, a small patch of dilated veins is seen on the left side of the septum. The interest in this case is the association of these abnormal retinal ves-

sels with an abnormal condition of the vessels of the eyelid and nasal septum. Other cases of this condition have been recorded.

**Velter** reports a rare case of *coloboma* of the papilla in a man 28 years of age. The right eye was normal in every way. In the left eye, vision was 1/40, the eyeball was microphthalmic. The ophthalmoscope showed a complete coloboma of the optic nerve head, all other portions of the fundus normal. The visual field was much contracted, especially the upper field, and there was considerable enlargement of the blind spot.

**Shumway** reported a case showing an unusual development of *hyaline bodies* on the optic nerve head. The young man's vision had been poor since childhood. The margins of each optic nerve were covered by extensive clusters of the hyaline bodies, which were peculiarly waxlike and glistening in appearance. The macular region in each eye was the seat of widespread superficial disturbance of the choroid and retina, so that vision was reduced to 20/30. There was *achromatopsia* for green.

**RETROBULBAR NEURITIS.**—In making a diagnosis of retrobulbar optic neuritis, which is an inflammation of the maculopapillar bundle of the optic nerve, **Nagle** points out that we are dealing with a condition which may be a symptom per se (alcohol-tobacco), or it is merely one factor of a symptom complex. The author quotes Uhthoff's statement that he was unable to name the cause of retrobulbar neuritis in fifty per cent of his cases at its incipency. The chief cause of retrobulbar neuritis in Germany would probably be considered to be multiple sclerosis. In our country, however, alcohol and tobacco are the most frequent causes. Some differential diagnostic points between retrobulbar neuritis and multiple sclerosis are mentioned, to show that in a large proportion of cases of multiple sclerosis, this condition occurs as an initial symptom.

**Lenoir**, in his thesis on acute infectious retrobulbar optic neuritis, describes the characteristic symptoms of

this affection. These are: rapid and often complete diminution of vision, accompanied by periorbital pain, increased by pressure on the globe; ophthalmoscopic appearance usually negative; the intensity of the pain being not necessarily in proportion to the gravity of the trouble. He describes the pathology, and states that the prognosis is generally favorable, there being recovery in a short time, with no marked visual defect.

**Roenne's** case of retrobulbar neuritis with *wandering defect in the visual field* began with a loss of the nasal lower quadrant, which was replaced by a relative paracentral scotoma to the nasal side of the center. This defect gradually moved into the upper nasal quadrant of the visual field, where it grew less marked and finally ended with a distinct, though not strongly accentuated, hemianopic boundary line in the upper nasal quadrant, before it passed over to complete recovery.

**Dor** believes that retrobulbar optic neuritis, in a large majority of cases, is due to a *periostitis* about the root of one of the two upper bicuspid *teeth* on the affected side. The periostitis is often accompanied by a dental fistula, or dental alveolar cyst. This condition is also responsible for numerous other eye affections, as venous thromboses with retinal hemorrhages, embolism of the central retinal artery, choroiditis, iritis. **Jocqs** reports a case of retrobulbar optic neuritis following a *nasal infection*.

**PAPILLEDEMA.**—**Collins** gives a case history similar to that of brain tumor. The patient suffered with *chronic nephritis*. There was a history of head-trauma. Tumor had to be excluded. The classic signs of tumor were present, headache, vertigo, vomiting and choked disc. Spinal puncture proved the cerebrospinal fluid to be under considerable pressure. It has frequently been remarked that the cerebrospinal fluid comes out under pressure in cases of anemia attended by "optic neuritis." It is quite possible to have a neoplasm develop in a person who has chronic nephritis; and it is possible to have a fundus picture typical of nephritis in a



brain tumor. If papilledema is the result of increased pressure of fluid in the vaginal sheath of the optic nerve, the pressure may in this case be the manifestation of edema, such as occurs in other parts of the body constantly in chronic nephritis.

Papilledema and other affections of the eye have frequently been observed in cases of accessory *sinus suppuration*, more especially when the suppuration has been in the sphenoidal or posterior ethmoidal cells. **Watkyn-Thomas** and **Scott** report such a case, associated with abducens palsy and other ocular lesions. A young soldier was struck below the right eye by a fragment of shell; there was no concussion. When seen two weeks later there was but little swelling of the lid, none of the ocular conjunctiva, no proptosis and no pain. He could count fingers.

The next day intense pain in the right eye set in, much increased by any movement of the head. Chemosis of the ocular conjunctiva soon developed, and intraocular pressure was much raised. Examination of the fundus showed the disc swollen to  $-3$  D. Skia-grams demonstrated a small fragment of the shell well forward, probably in the ethmoid labyrinth. During the process of the operation which was performed on the following day, the fragment fell into the antrum, where it was thought best to allow it to remain until the other parts were more nearly healed. There was a resulting diplopia due to paralysis of the external rectus. The swelling of the disc rapidly lessened and in a month's time the vision was  $6/24$  and the weakness of the external rectus much less. The increased tension was thought to have been caused by the pressure of the edematous orbital tissues on the ophthalmic veins.

**Wallis** reports a case of *papilledema* which did not manifest itself until two months after the injury which caused it. The patient, a young soldier, received no less than thirty wounds from the explosion of a trench mortar bomb. The left ramus of the lower jaw was shattered, and in the attempts to remove sequestra of the mandible there was apparently set up a local *meningitis* from in-

fection through a traumatic fissure of the glenoid fossa. A well developed papilledema was present, the swelling being  $+3$  D. above the rest of the fundus. One year later the visual field was full for a 5 mm. white object, and the visual acuity was  $6/5$ . The fundus appeared normal with little or no atrophy of the nerve. The importance of dealing very cautiously with a wound of this character requires no emphasis, for it is obvious that much disturbance of the parts might give rise to a fatal meningitis.

**Kearney** discusses the value of eye ground observations in recent *fractures of the skull*. Based on the examination of 212 cases that were diagnosed as fractures of the skull, he concludes that a rise in the intracranial pressure above normal is usually one of the most damaging factors. When examined within 24 hours after the injury there is usually found a general edema blurring equally all the details of the fundus, which if uncomplicated, gradually subsides. Occasionally there will be a gradual increase of the edema, which means an increase of intraocular pressure. In some instances the edema of the disc amounts to a true papilledema and in these cases a lumbar puncture has relieved the condition. When the pressure is still greater, cranial decompression is advised.

The rather unusual occurrence of a complete *bilateral ophthalmoplegia* with choked discs, is reported by **Blake**. The patient was an eight year old Russian girl. The first symptom complained of was a severe headache and when her eyes were first examined, one week later, the patient was lying apathetically with eyes closed. The lids could be opened with considerable effort and the eyes were fixed in a straightforward stare. There was only the faintest mobility in any direction. The pupils were widely dilated and reacted only in the least degree to light. Fundus examination revealed an intense swelling of both nerve heads with no hemorrhages or exudates into the retina. There was no light perception. The general physical examination, including exploration of the nasal si-

nuses, was entirely negative. The patient was kept in bed, cathartics given, and ten drops of saturated solution of potassium iodid given three times a day. Improvement in her condition began immediately and in a few weeks the eyes appeared practically normal with 20/20 vision in both eyes.

A double papilledema occurring several months after a head injury from falling down stairs, is reported by **MacKenzie**. From the signs and symptoms a diagnosis was made of a tumor located in the region of the right inferior frontal convolution. In the right eye the swelling of the disc was 6 or 7 D. and only slightly less in the left. The patient was operated on, the dura opened and a considerable quantity of almost black fluid and dark clots were removed. The symptoms all subsided rapidly and in a few weeks there was no evidence of swelling of the disc, distension of the veins, or hemorrhage.

**Weyers** reports the case of a papillitis due to a large abscess of the frontal lobe, following an acute *otitis media*. There was paralysis of the facial nerve on the affected side, and spasm of the same nerve on the other side.

**McCaw** presented a young woman with poor vision, diplopia, swollen discs, tortuous retinal vessels, inability to read, metamorphopsia and exudate at macula. The fundus of the left eye had the appearance of albuminuric retinitis. There was a positive Wassermann reaction. The patient was given anti-luetic treatment. Two cases of optic neuritis following tumors of the hypophysis have been reported by **Shikano**. In both of these there were apparently *syphilitic gummata* in the region of the sella turcica. The skiagrams showed that both have been destroyed by the pressure.

**OPERATIONS FOR PAPILLEDEMA.**—In a boy eighteen years of age, whose vision had failed rapidly during the preceding year **Osborne** found typical *choked discs* in both eyes. Vision in the right eye was 5/30, left, counting

fingers at 3/4 m. Examination by many internists revealed no cause for the condition. After several days of treatment with no beneficial result, *lumbar puncture* was resorted to. The force of the pressure of the spinal fluid was unusually great. Vision began to improve immediately and eventually became normal.

In the course of an extensive study of the eye grounds in cerebral *spastic paralysis* with changes attributed to abnormal increase in the pressure of the cerebro-spinal fluid, **Kearney** examined the fundi of an infant two weeks old, after a difficult instrumental delivery, who had convulsions about every hour. He found a recent transparent papilledema with elevation of 2 D. confined to the nasal side of the disc. A *decompression* operation was performed and a subdural hemorrhagic clot removed; two days later no elevation of the disc was found. By the time the greater number of children who are suffering from cerebral spastic paralysis, reach the neurologic surgeon, the eye grounds show only regressive edematous changes. Even at this late date the writer has obtained gratifying results by a decompression operation, in selected cases.

Papillidema, in its early stages, gives rise to no disturbance of function. After a time, diminution of visual acuity begins, and increases rapidly to total blindness. The best chance of relieving the condition is by lowering the intracranial tension before the visual acuity has begun to fall. The best result has been obtained by trephining, but recently lumbar puncture has been used as a preliminary substitute for trephining, since it is much less dangerous, and can be followed, if inefficient by the larger operation. In certain forms, especially in cases of hydrocephalus, *puncture of the corpus callosum* would seem to be as efficacious as trephining, and in these cases **Dutoit** is inclined to recommend it before the vision has begun to fail.

(Continued next month)



# DIGEST OF THE LITERATURE.

## THE OPTIC NERVE.

CHARLES P. SMALL, M. D.

CHICAGO.

(Continued from July issue)

**Spiller** and **de Schweinitz** have observed three cases in which removal of a few cubic centimeters of cerebrospinal fluid has had a remarkable effect on swelling of the optic nerves. In the first patient, a decrease of one diopter was noticed after each lumbar puncture. Two of these cases from a preliminary examination strongly suggested brain tumor, but after a more careful study the diagnosis of encephalitis was made in one case, and of pseudotumor from intoxication or infection in the other.

An operation to cure choked disc is suggested by **Müller**. He resects the temporal wall of the orbit, pushes the eyeball forward, and thus obtains access to the optic nerve. He then *resects a piece of the sheath* 3 or 4 by 6 mm. This relieved the pressure on the nerve in the cases in which he has applied this method, and not only arrested the further progress of the visual disturbances but caused their partial retrogression, and at the same time improved the cerebral symptoms from pressure on the brain.

**PAPILLEDEMA RECOVERY.**—**Krauss** reports a case of choked disc, in a young man of 23, who had been operated on two months previously for goiter. The discs became swollen to +4 D. and +5 D. While central vision was not much impaired he had almost continual attacks of dizziness and intermittent attacks of blindness. The swelling of the discs increased for six weeks, then gradually subsided. The neuroretinitis was followed by a low grade of optic atrophy with a moderate degree of contraction of the form fields. Treatment consisted mainly of five grains of calcium lactat three times

a day. In about nine months there was a full visual acuity.

**OPTIC NEURITIS FOLLOWING ACUTE INFECTION.**—In a patient suffering from *ethmoiditis*, **Bruder** found a resulting retrobulbar neuritis. There was sudden obscuration of vision in the right eye following a cold, and a purulent discharge from the right nostril, associated with headache and a dull pain over the right orbit. Vision was reduced to hand movements. Three days after removing nasal polypi and curetting the posterior ethmoidal cells, the patient's vision was restored to 20/40.

**Wyler** calls attention to the difficulties in the diagnosis of monocular optic neuritis. The *diagnosis* of the eye condition is simple, but the cause is often difficult to find. He supposes the cause to be a local one in the majority of cases, rather than a constitutional or focal one; altho in the latter class the transmission of toxins or bacteria from diseased tonsils, from peridental infections and from latent gonorrhea, have all been responsible for this condition. In order to avoid overlooking any possible feature, he follows a routine examination: roentgenograms of sinuses and teeth, a perimetric test with the campimeter to trace any enlargement of the blind spot (an early feature of sinus optic neuritis). If these are negative a Wassermann test, together with a Hecht-Weinberg test and a urinalysis are made. This is followed by a complete physical and neurologic examination. In case these proceedings are negative the tonsils, sphenoids and ethmoids are explored.

*Tonsillar infections* are the basis for many systemic or local lesions, but op-



tic neuritis from this cause is not a common clinical finding. Such a case was observed by **Suker** in a twenty year old girl. Complete laboratory examinations excluded any other possible cause. After enucleation of the tonsils, which were markedly hypertrophied and full of crypts containing much debris, vision in the affected eye, which was reduced to 20/60, rose in 72 hours to 20/20. The greatly contracted field of vision also became normal and remained so.

A case of monocular optic neuritis following *pneumonia* is reported by **Tenner**. The patient aborted on the day following the onset of the pneumonia. Two weeks later there was a dimness in her left eye. Four weeks later, vision in that eye was reduced to 1/200. There was a large absolute scotoma, and the field of vision was slightly contracted below and nasally. The disc margins were blurred and the veins dilated. Recovery was complete at the end of six weeks.

**Mygind** reports four cases of purulent otitis media with partial affection of the labyrinth, complicated with optic neuritis. In all indefinite signs of intracranial complications (headache, vertigo, vomiting, etc.) were found, but they recovered without operation. Mygind thinks with Koener, that the cases of diffuse, purulent *otogenous meningitis* with favorable course, are accompanied by optic neuritis.

**Birch-Hirschfeld** obtained good results in three cases of optic neuritis, thru treatment directed to an empyema of the ethmoid. In testing the vision he recommends to add to the methods usually employed, the measurement of the blind spot, which is possible only in very intelligent patients. A transient impairment of vision in the third case he demonstrated to be due to an enlargement of the blind spot. **McKeown** presented a man with disease of the optic nerve and retina, due to accessory sinus disease. His vision was 20/70 when first examined, but it had fallen to 20/200, and improved later to 20/100. He had a central scotoma with a good form field.

**Galtung** discusses the connection between disease in the nose and in the eyes, especially affections originating in the nasal accessory cavities and involving the optic nerve but without causing an abscess in the orbit. In the case of a man of 45, both the sphenoidal and ethmoidal sinuses were affected, and this was especially responsible for the optic nerve trouble. Vision was considerably reduced, and there was peripapillary and paracentral scotoma. As soon as the accessory sinuses had been cleared out on one side the scotoma on that side subsided, but on the other side it persisted unmodified until this side had also been operated upon. The scotoma then subsided entirely and vision improved. Galtung called attention to the fact that it is exactly 100 years since Beer first pointed to the close connection between diseases in the nose and in the eyes.

**OPTIC ATROPHY.**—A case of bilateral optic atrophy in a seven year old boy is reported by **Weber**. He was able only to count fingers in a good light. There was horizontal nystagmus. Both pupils were moderately dilated and neither of them responded to light nor accommodation. Ophthalmoscopic examination showed nearly complete optic nerve atrophy in both eyes. X-ray examination furnished no evidence of anything abnormal at the base of the skull. There was no obvious hydrocephalus or cranial deformity, nor were there signs of disease elsewhere in the body. Excepting a doubtful history of injury to the head, there was nothing in the past history of the patient which threw light on the case.

But his blood serum gave a positive Wassermann reaction, and so did that of his mother and of one of his sisters; while another sister had been treated for *congenital syphilis*. Weber also reports a case of bilateral optic nerve atrophy in a child three and a half years old. Physically and mentally the child appeared fairly normal. There was a history of infantile convulsions up to the age of fourteen months. The child's blood serum and that of her mother gave a positive Wassermann reaction. A younger brother of the

father was said to have had a blind prematurely born child.

A case of bilateral optic atrophy is reported to **Burns**, which was marked by sudden and complete blindness. The patient, a short time previously had taken a teaspoonful of strong whiskey three times a day, during an attack of tonsillitis. About two weeks later the urine was found to be loaded with albumin and shortly afterwards she had a miscarriage. The optic atrophy was due either to *nephritis or alcohol*, but difficult to say which. The vision gradually cleared to 20/200, which the patient declared was as good as it had ever been.

Among 19,893 patients, **Kirkpatrick** observed 44 cases of optic atrophy. Seven of these were classed as primary, 37 as secondary, but of the latter only three followed acute neuritis. In the other 34 the postinflammatory changes were very slight. Of these 34, 32 occurred in males. None of them gave any history of previous severe illness. In 73 per cent there was reason to suspect consanguinity; but this is very little higher than the percentage of consanguinity in the general population. In 22 out of 26 cases there was a positive Wassermann reaction, and one other patient stated he had had syphilis. In 19 cases the changes affected only the optic nerve head, and of these 17 had suffered from syphilis. The same number gave a history of consanguinity in the parents, and in 15 patients both conditions were present.

**Tomosi** reports *color disturbance* in an amaurotic patient with optic nerve atrophy. The patient stated that on one day he had yellow vision and on another day blue vision. On the day with yellow vision, the patient felt warmer and thought he saw better, while on the day with the blue vision the opposite was the case.

Two cases of *Leber's disease*, occurring in a brother and sister, are reported by **Pollock**. X-ray examinations of the sella turcica showed almost identical conditions in both patients. There was a shadow like a very small bean, with the concavity downwards, situated in, but a little below, the cen-

ter of the sella turcica. The diagnosis of Leber's disease was based on the condition of the optic nerves, the absence of all signs of hereditary syphilis, the age of onset (11 and 9 years), the character of the fields of vision (central scotoma and some shrinking of the periphery), the relationship of the two children, the almost complete loss of vision under antisyphilitic treatment, and finally the relative improvement after the treatment with organotherapy.

In **Espejo's** case, a man of 49, there was no history of headache or ocular paralysis. The blindness came on gradually first in one eye, and after some time in the other. There had been lancinating pains and some tendency to ataxia for a few months. All the cases from his records teach the necessity for curing the *syphilis* in the secondary stage at least, as the only means to certainly ward off *atrophy* of the papilla from tabes later.

A case of optic atrophy in a young Hebrew was exhibited by **Holloway**. General physical examination was practically negative, with the exception of a slightly positive Wassermann reaction. But the man's head was of a modified "tower-skull" type. Right vision, fingers at 15 inches; left vision, 6/15. There was a divergent squint of the right eye, measuring 10° on the perimeter. X-ray plates showed an enlargement and displacement of the sella turcica and the massive bony development of the face. Each disc showed a well advanced atrophy.

**Levy** reported a case of optic atrophy in the right eye of a nine year old boy. Vision was restricted to hand movements at 1/2 metre. No history of any material kind could be obtained. X-ray showed some *enlargement of the sella turcica*, also a peculiar marking of the inner table of the skull, many ridges and depressions.

In a syphilitic patient who was suffering from a hyperplastic sphenoiditis and ethmoidal abscess, an intravenous injection of *salvarsan* was given and two days later vision was very much reduced. Four months later the sphenoid and ethmoid sinuses were opened and



treated, but only a small amount of secretion was ever found there. In reporting this case **Charles** was in doubt as to whether it was a simple syphilitic atrophy of optic nerves coincident with and independent of disease of the sinuses, or that one condition was the cause of the other. He believes it preferable to use mercury injections and inunctions rather than to give salvarsan, where the optic nerve is already involved. It is generally admitted, however, that with normal nerves salvarsan is not neurotropic, because reaction in a nerve requires the presence of spirochetes in the nerve, and access of the salvarsan to the spirochetes which seems to be doubtful.

A case of optic atrophy of traumatic origin, in a man forty years of age, is reported by **Spencer**. The patient gave a history of having been run over by a wagon wheel when eight years of age. The accident rendered him unconscious and he had hemorrhages from mouth, nose, and ears. Since then his vision has gradually failed, and at present time it was R. V. = 6/30, L. V. = 1/60. Visual fields are greatly contracted. Blood and spinal fluid Wassermann's negative. X-ray shows an old basal fracture, but no abnormal condition of the sella, hypophysis or accessory sinuses. General health is perfect.

**Bell** reported the case of a child eight years old, who, a year previous had been struck just below the left eye, and three stitches had to be taken in the wound. Since that time vision in the left eye had steadily declined until at the present time she could detect hand movements at five feet only. There is a simple optic atrophy, caused presumably by a fracture into the optic foramen resulting in pressure upon the nerve.

**Osborne** reports a case of complete bilateral optic nerve atrophy resulting from an electric shock. The patient was an employe of an electric traction company, and accidentally touched the conducting wire on his car, receiving a charge of between 450 and 500 volts. When seen, about two months after the accident, both optic nerves pre-

sented the appearance of a very advanced stage of atrophy.

A case of primary optic atrophy in an 8 year old boy, was presented by **Stilwill**. Vision was R. = 4/20, L. = 4/15. Both nerve heads were white, nutrient vessels on disc faint; not much change in veins and arteries, but diminished in number. Degenerative changes in the retina, especially in macular region; fields contracted for form and color. As there was a positive blood Wassermann reaction, the cause was believed to be syphilitic.

**Gennerich** points out that we must admit two different points of origin of the morbid process in tabetic optic atrophy; the obliterating endarteritis and the infection of the cerebrospinal fluid. Gennerich agrees with Behr on the subject of the culpability of tabetic optic atrophy, but disagrees with his statement that cerebrospinal syphilis is caused by a spirochetosis of the meninges and their prolongations, and tabes and general paralysis by an infection of the brain substance itself.

**Suker** exhibited two patients with tabetic optic atrophy, both of whom had been treated by ventricular injections of mercury. One man had received three injections, and his field of vision had perceptibly increased. In this instance 60 cc. of ventricular fluid was withdrawn before the injection. He received 1/20 to 1/50 of a grain of bichlorid of mercury and his mentality had decidedly changed for the better. The other patient was also a tabetic who showed an absence of patellar reflexes, but after receiving the mercury injection the reflexes were restored. This man should be considered not a true tabetic but a senile dement, and in contradistinction to tabes, the man would probably maintain his vision and even improve. The cerebral type of lues, particularly in those cases in which one gets a modified type of Argyll-Robertson pupil, is the most favorable.

In another patient, a girl of 16, with taboparesis, it was noted that for a year her vision had been rapidly failing, she had become nervous and irritable, forgetful, and showing difficulty



in walking, very dizzy and had severe headaches and more or less lancinating pains. She was given four ventricular injections from ten days to two weeks apart, and the amount of bichlorid of mercury increased from 1/100 gr. to 1/25 gr. Following the injections, the reactions were sometimes pronounced within 12 to 24 hours, necessitating a spinal puncture and the withdrawal of about 10-15 cc. of the fluid. The patient showed great improvement in every respect after five months, with vision remaining the same.

The epoch making innovation of the treatment of primary optic atrophy by means of intraventricular therapy, as advanced by Schoenberg has led **Goldenburg** to treat a number of patients by this method. Because of the fact that spirochetes exist in the central nervous system, cerebrospinal fluid and in the blood, one has a logical basis to reason that they will be found in the optic nerve at some not distant

date. That this is a rational method of treatment is borne out by the fact that the endothelium covering the choroid plexuses acts as a barrier to many drugs used in the treatment of lues. Also the fact that the cerebrospinal fluid circulates through the spaces of the brain down to the spinal canal, leads to the conclusion that injections into the spinal canal would be compelled to rise against the current.

In the case reported, the patient received five injections in the course of three months. The patient died four months later from general paresis. In spite of this heroic treatment not only was no harm produced, as evidenced from reports from the attending physician of the institution where he was confined, but the usual progressive process of atrophy was for a time at least arrested. Limited vision was present practically to the very instant of death, where otherwise total blindness in all probability would have been the result without this method of treatment.

## VISUAL TRACTS AND CENTERS.

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This section reviews the literature to June, 1918. Closely allied topics are considered under Optic Nerve, or will be taken up under the head of Injuries in a subsequent number.

**PHYSIOLOGY AND PSYCHOLOGY.—Parsons**, writing on the *apocritic principle* and the evolution of visual perceptions, suggests that the earliest outward and manifest sign of the differentiation to luminous energy is the development of pigment cells on the surface of the body. The appreciation of movement is the prime function of the visual organs, the tactile element having become specialized to respond to luminous stimuli. The appreciation of movement by the skin and by the retina is characterized by a successive stimulation of serial end organs. "Apocritic principle" is the term applied by Parsons to the cerebral grouping of visual perceptions.

The essay by **Lippincott** on the *binocular metamorphopsia* produced by optical means largely covers the same ground as a paper published by the same author in 1889 on the binocular metamorphopsia produced by correcting glasses. The condition giving rise to binocular metamorphopsia is described as a disturbance in the relation between direct and indirect convergence. The dissimilarity may take one or both of two forms: First, inequality in width, as produced by spherical glasses or by cylinders with axes vertical or horizontal. Second, want of parallelism between the images of the vertical lines which help to make up every surface. The want of

parallelism may be seen either as a difference in the angle of inclination, the effect of cylinders with axes oblique; or as a difference in form, the effect of prisms.

**Compère**, in a paper entitled "The Effect of Harnessing Up Indirect Vision," puts forward the idea that by overcoming *indirect vision* when one desires to concentrate on a special field or object it may be possible to relieve a spasm which often produces blurred vision, headaches, reflexes, and even muscular defects. The new methods of treatment by which **Bates** claimed to relieve a case of blindness of many years' standing is somewhat too impalpable to be given definite statement here. To the ordinary mind the result would appear to have been achieved by psychic control of the patient, altho the title "central fixation" is given to it by the author.

**Lenz**, writing on the histologic *localization of the visual center*, suggests that the question whether peripheral blindness is later followed by degenerative processes in the central terminal apparatus of the visual fibers in the occipital lobe has not yet been solved. The very exact studies of the writer, well illustrated by microphotographs, indicated specific pathologic changes in the cell structure of the calcarine fissure of blind persons; but only in the internal granular layer and in the pyramidal layer. These changes consisted of a pronounced rarification, increasing in intensity above. The findings favor a localization of the macula, and of its immediate vicinity, in the posterior section of the calcarine fissure. The mode of origin of the cortical change is explained by the writer as a sort of atrophy from inactivity, resulting from the absence of visual stimuli.

The note by **Rider** works out an analytic expression for the equal parallax curve showing the distances that a man, and a bird must move forward to give the same apparent displacement of objects against the horizon, for either frontal or lateral vision.

The paper by **Franklin** aims to show that *stereoscopic* and *perspective* vision are essentially different, tho they complement each other in a rather complicated

manner. He emphasizes the argument that it is not mere dissimilarity of pictures which produces a sense of depth in looking thru the stereoscope, but the play of the muscles of convergence; and that the same is true with regard to the stereoscopic appreciation of real objects. As an experimental proof of this he suggests the following experiment: A stereoscopic picture card is bisected and the relation of the pictures reversed so that their outer edges are approximated together. Viewed thus, as near to the eyes as is comfortable, there gradually appears the peculiar effect of the view being turned "inside out," the relative distance of foreground and background objects being reversed.

**WORD BLINDNESS**.—The case of *congenital word and letter blindness* without aphasia described by **Weber** was in a boy of ten years. There was the usual ability to recognize Arabic numerals, but an extreme backwardness in arithmetic. The patient had learned to write and to recognize his own name. There was no word deafness and no aphasia. The eyes were normal and the patient was not color blind. His mother had been somewhat backward in learning to read as a child. The patient's brother was not word or letter blind. The Wassermann reaction was positive in the mother and the two children, and the father had died at the age of thirty-seven years in a lunatic asylum. Apart from the word blindness the boy seemed intellectually almost normal. In another case described by Weber, the boy had apparently had a relatively mild attack of cerebrospinal meningitis or of acute encephalitis at the age of two years. The damage probably thus resulting to the cerebral cortical speech centers had resulted for a number of years in partial aphasia and dysarthria. Recovery finally occurred, this being attributed by Weber to a gradual process of compensation and reeducation.

**Billström's** patient was a man of sixty-five years, with marked arteriosclerosis, who six weeks before coming into the hospital had had a short apoplectic seizure. The cerebral symptoms were a general psychic torpidity, complete verbal alexia, partial literal alexia, inability to form words out of letters, to read



what he had written, and inability to copy what was written. The ability to write spontaneously from dictation was retained. Death occurred a month later. Postmortem examination showed softening of the angular gyrus of the left side of the brain.

Several cases of developmental alexia or congenital word blindness are related by Heitmüller. Two of the patients had letter and word blindness, while the other two knew the alphabet but could not read or spell words of more than one syllable.

**MIRROR WRITING.**—**Symms'** case of mirror writing was observed in a child of six and a half years. She was left-handed, and in addition to being unable to write except in the looking glass manner, displayed a similar defect in drawing; crying bitterly one day because, when asked to draw the story of the three wise men, she was unable to depict them as walking toward the manger. Symms calls attention to the fact that if an attempt be made by the ordinary individual to write simultaneously with both hands, the mind being concentrated on the right hand, the tendency is to produce mirror writing with the left hand. As the left-handed child grows older, and the details of the optical image fix themselves more firmly in the memory, the tendency to mirror writing becomes less marked.

In a paper which is mainly devoted to throwing doubt on the supposed importance in aviation of a healthy condition of the labyrinth, **Fridenberg** suggests the significance in this occupation of such visual factors as hypersensitiveness to bright light, the sharpness of the sense of motion pertaining to the retinal periphery, acuity of vision in reduced illumination, and rapid and accurate judgment of distance, direction, size, and space. **Hughes** reports an apparently causeless case of alleged monocular diplopia, which the patient was in the habit of relieving with a mydriatic before he went hunting.

**Reeves** writes an account of the *evolution of vision*. **Maggiore** presents a general review of the subject of synopsia, or colored audition. **Jordan** tabulates the various *color sensations* suggested to himself, his two sons, and two

other persons by the various letters of the alphabet.

**TRAUMATIC DISSOCIATION.**—An important paper by **Riddoch** deals with the subject of dissociation of visual perceptions due to occipital injuries, with especial reference to appreciation of movement. From a series of ten cases discussed in the second chapter of the paper, Riddoch concludes that in restricted visual fields from occipital injuries where some recovery of vision occurs, the first visual stimulus perceived which can be recorded on a chart as a field is movement. The recovery of vision for movement begins in the peripheral field. Appreciation of movement and recognition of an object are always dissociated in patients in whom recovery of vision can be demonstrated; the field for the former, which is the more primitive perception, being the larger. This dissociation is a valuable aid in prognosis, for when it is absent after a few months have elapsed no recovery of vision occurs.

Case three of the series dealt with in chapter two presented certain defects in visual orientation which are described separately in chapter three, since they seem to throw light on the nature of stereoscopic vision and on the relation of cerebral defects of vision to those of general sensation. The patient was blind in the left half fields, but later became able to appreciate movements in the periphery of their lower quadrants. His ability to orientate in space, things that he saw quite well was almost entirely lost; and thickness and depth meant nothing to him visually. He was at first frequently unable at once to bring objects which he saw into central vision.

At the time that the report was completed, altho the patient had no difficulty in keeping his eyes fixed upon a moving finger his movement was not of the eyes but of the head. He stated that he was accustomed to moving his head about when he read, that he did it unconsciously. But he had no trouble in keeping his eyes fixed on an object when his head was passively moved, nor in following it with his



eyes when his head was kept fixed by the observer. His visual memory was apparently intact.

Visual orientation, however, was grossly upset. He was unable to localize in space the position of an object seen. He could tell only if an object was very near or very far away. He was able to judge with a fair degree of accuracy the height or length of different objects, but occasionally he made gross mistakes. He was unable to estimate correctly relative distances and lengths, and the answers were equally wrong whether the objects were far away from him or near to him; but he never said that the nearer object was the more distant. One day while being tested, he said: "Everything seems to be really the same distance away, for example you appear to be as near to me as my hand." (He was holding his hand an inch and a half from his face and the examiner was sitting about five feet away from him.)

His most interesting defect was inability to appreciate depth or thickness in objects seen. Persons looked at had color and light and shade, but to the patient presented no protruding features, everything being perfectly flat. One result of this phenomenon was that friends were recognized only by their voices. A sphere appeared merely as a circle, a cylinder as a flat rectangle, a cube as a square, and a pyramid as a triangle. With all this he possessed binocular vision. His own expression was that something else that indicated depth had been taken away.

Defects in spacial discrimination, similar in character to the visual dissociations described, were evident in the patient's right hand. Localization of a touch was defective in the first three fingers. Each finger had to be passively moved on an average thru eight or nine degrees before he was conscious that the position had been altered; whereas he recognized a change of posture when a finger of the left hand had been moved thru one degree. Appreciation of relative thickness of things was not nearly so acute with his right as with his left hand.

Riddoch's general conclusions are briefly as follows: Movement should be given a place among the stimuli which are recognized as originating visual perceptions. Light and movement are the first stimuli to be appreciated in a recovering visual field. The fields for movement, charted at intervals, give the earliest indications of recovering vision. Where no movement is perceived after an interval of some months has elapsed, the affected field will probably be permanently blind. Recovery for the appreciation of movement begins at the periphery of the field and extends inward toward central vision. The types of visual dissociation exhibited are analogous to the dissociations of general somatic sense impressions, described by Head and his coworkers as occurring from cerebral injuries.

**CEREBRAL LOCALIZATION.**—In seven of Riddoch's cases a consideration of the probable damage to the brain along with the charts of the visual field yields facts which support the contentions of **Holmes** and **Lister** on *cortical representation of the retina*, namely that macular vision has its center in the posterior part of the visual area; that the macula, like the rest of the retina, is not represented bilaterally in the cortex; that the cortical center of the peripheral zones of the retina is in the anterior part of the area striata; and that the superior quadrants of each retina are represented in the upper, and the inferior quadrants in the lower part of each visual area.

**Holmes'** paper on visual localization and orientation is based upon a series of cases in which disturbance of the fields of vision was due to injuries of the visual cortex of the brain. In hemianopia due to slight injuries of the parietal regions, a daily recovery of the field from the center to the periphery had been noted. Such injuries were probably of the nature of contusions, possibly associated with edema, capillary hemorrhages, minute lacerations, changes in the myelin sheaths, and even a molecular disturbance of cells, but evidently without permanent anatomic loss.

Holmes elaborates the following conclusions as a working hypothesis for further investigations: The upper half of each retina is represented in the dorsal, and the lower half of each retina in the ventral, part of each visual area. The center for macular or central vision lies in the most posterior part of the visual areas. The macula has not a bilateral representation. The center for vision served by the periphery of the retina is situated in the anterior portions of the visual areas, and the concentric zones of the retina from the macula to the periphery are probably represented in this order from behind forward in the visual area.

Severe lesions of the visual cortex produce complete blindness in the corresponding portions of the visual fields. If they cause incomplete amblyopia, color vision is generally lost and white objects appear indistinct; or a condition may arise in which only more potent stimuli, such as objects moving abruptly, excite sensations. The defects of vision in the fields of the two eyes are always congruous and superimposable, provided that no disease or injury of the peripheral visual apparatus exists. Lesions of the lateral surfaces of the hemispheres, particularly of the posterior parietal regions, may cause certain disturbances of the higher visual perceptual functions with intact visual sensibility, as loss of visual orientation and localization in space, disturbance of the perception of depth and distance, visual retention loss, and visual agnosia.

The paper by **Marie and Châtelin** on visual disturbances due to lesions in the intracerebral optic fibers and the visual cortical areas following injuries of the head by projectiles is abstracted from the French by Camp in the following terms: The patients studied were those in whom injuries to the occipital region by bullets or pieces of shell caused disturbance in the visual fields. Each case was studied by X-ray to show the exact location of the projectile if it remained, or to show the site of the opening in the skull if it had been removed by trephining.

Five cases presented lateral *homonymous hemianopia*. One case showed lateral *homonymous hemiachromatopia*. There were two cases of cortical blindness in which vision later returned but with extremely retracted visual fields. In five cases there was inferior horizontal hemianopia but with more or less irregular fields. This condition is to be attributed to injury to the superior lip of the calcarine fissure. There was no case of superior horizontal hemianopia, probably for the reason that the inferior lip of the calcarine fissure is so near the cerebellum and the lateral sinus that an injury in that region is fatal. Quadrant anopia is not uncommon.

Hemianopic *scotomata* are divided into three categories: First, macular and paramacular; second, purely macular; third, multiple. The perimetric examinations are most important, because the patient is usually unconscious of the nature of his trouble and complains only that his eyes tire rapidly or that he has difficulty in reading. From a study of these cases it appears that the macula is represented in the cortex at the point of the occipital lobe. The hemianopic scotomata were homonymous, but not mathematically identical. Among the cases difficult of interpretation were cases of ring scotomata or double ring scotoma.

Out of three hundred cases of head injury examined thirty-one showed changes in the visual fields. In some of the others the occipital lobe was injured, but in these cases the projectile was either deep in the occipital lobe or on the external surface. The opinion of Henschen that the visual cortex is confined to the region of the calcarine fissure is confirmed by these observations. In the majority of cases the X-ray examination showed an intracerebral projectile. An increase in the scotoma indicates abscess formation and operation is then advisable. In other cases an operation usually increases the scotoma and is therefore not advised.

In the case described by **Abelsdorff**, a wound of the occiput was followed by a small left paracentral hemianopic



scotoma which, during the healing of the wound, was transformed into a bilateral central scotoma, without the presence of any other anomaly of visual acuity. This production of a central scotoma in both eyes by a wound of the optic center satisfies the author of the correctness of the contention of Henschen and Wilbrand as to a specialized cortical correspondence with the fovea centralis.

The conclusions of **Beauvieux** as given in his serial treatise on visual troubles in wounds of the visual sphere do not differ essentially from those of Marie and Châtelin. He is satisfied that the *visual cortical zone* is localized in the posterior part of the brain, in the occipital region; this zone being apparently limited to the internal surface of the occipital lobe, the calcarine fissure, and the superior and inferior margins of this fissure. The external surface of the occipital lobes does not form a part of the cortical centers of vision. The grouping of the fibers is in quadrants, the fibers being placed in the same order as in the retina, with isolated conduction for the superior or inferior quarter of each retina.

According to this anatomic conception, *circular hemianopic scotomata* can be explained only by a symmetric and bilateral disturbance of the radiations with special grouping of the nerve bundles innervating a circular retinal zone, or by destruction of fibers of association uniting by the intermediary of the corpus callosum two identical portions of the visual centers, or finally by a purely functional syndrome without a true lesion of the optic tracts. The circular bundle does not appear to Beauvieux to have a precise and circumscribed localization at the level of the calcarine fissure. The macular fibers seem rather to radiate in a fan over the whole visual cortical surface.

**THE LATERAL FIELDS.**—The name "temporal crescent" is applied by **Behr** to the outer rim of the temporal field of each eye which extends beyond the nasal field of the other eye when the field of the one eye is laid upon that of the other. His paper relates to ho-

monymous hemianopias with unilateral defects in the purely temporal crescentic area of the binocular visual field. The centripetal fibers from this semilunar area do not take part in the mingling of the remaining fibers, but run in a separate bundle to the cerebral cortex, where their projection likewise is taken care of by a special area. **Behr** observed five cases in which at certain stages of the disease a defect in the temporal crescent was the only sign of an affection of the central optic tract. A unilateral absolute or relative defect in the purely temporal visual area, together with concentric contraction of the color boundaries in both of the coinciding halves of the visual fields, justifies the assumption of a disease of the central tract. **Behr's** cases support **Wilbrand's** theory of the cortical projection of the macula.

The contention of **Wilbrand**, that the nerve fibers which supply the temporal crescent of the visual field pass in a bundle separate from the rest of the optic nerve fibers, between the chiasm and the occiput, is also supported by **Fleischer**, who further maintains that these fibers retain their separate position in the occipital lobes, and also have a separate area of distribution to the cortex of these lobes. In one case of shot wound of the occiput which he describes, the temporal crescent of one eye was destroyed by a shot lying just beneath the cortex of the lobe, whence it was later removed. In two other cases the crescent was partially preserved, in one case after the extraction of a bullet from the occipital lobe, in the other after the formation of an abscess following a shot wound.

**PERMANENT HEMIANOPIAS.**—**Unthoff** summarizes the findings in forty cases of shot wound of the occiput, three-fourths of which were complicated by hemianopic visual troubles. In only one of these cases did permanent total blindness follow the wound, and in this case optic atrophy was the final outcome of a complicating meningitis. Only one of the patients had to be classed as economically blind. Four patients died. Inferior hemianopia was much more common than superior,



of which there was only one case. Only isolated examples of visual fields which were not hemianopic in character were met with in this series of cases. Primary transient blindness and primary loss of consciousness were very common. The ophthalmoscopic appearance was usually normal. Pupillary and muscular disturbances were relatively rare. In a few cases hemianopic hallucinations were observed. All but one of the patients were unfitted for further service in the field.

The paper by **Axenfeld** on hemianopic disturbances of the visual field after shot injuries of the skull is complementary to that of Uthoff. Eight cases are discussed, in half of which there was double hemianopia without paresis in other regions. In four cases the lower half was influenced in a more pronounced manner but not exclusively. In persistent injuries of the visual centers, the upper parts near the calcarine fissure are apparently more exposed than the lower ones. In several cases the patient was unable to return to work at his trade; in one case the available vision being insufficient for any work, while in another case, in spite of perfect central visual acuity, the lower segment was so affected as to interfere with the working ability. In one case there was a choked disc which was not due to a cerebral abscess, but was provoked by the trauma, which was also responsible for the destruction of cerebral tissue and for hemorrhages.

**TRANSIENT AND PARTIAL HEMIANOPIAS.**—Upon the basis of seven cases which are described, **Hine** discusses the recovery of fields of vision in concussion injuries of the occipital cortex. He finds that in the case of an injury at or near the occipital pole, the hemianopia is very frequently complete, macular escape being less commonly encountered than in the majority of civil cases of lesions producing hemianopia. In Hine's experience the field of vision never returns in the lower quadrant before the upper, but always vice versa, this being due to the fact that all the injuries recorded by him have been above the occipital pole, which is situated as a

rule about one inch above the inion. Since restoration of color perception appears to come later than that of perception of white, it is important, when investigating any patient suspected of having had an occipital cortical injury, to use small colored test objects as well as the white, as otherwise a partially recovered lesion may quite readily be missed and the fields recorded as complete.

**Piéron** argues for the existence of at least three degrees of cortical hemianopia, basing his argument upon the case of a soldier who was injured in the left occipital region from the explosion of a shell. The apparently blind half of his visual field proved in reality to possess vision of large shadow masses, or very luminous surfaces belonging to this part of the field. The boundaries of light vision in the anopic field, provided sufficiently intense luminosity was employed, were the same as those of the normal field. There was, however, in this blind half of the field achromatopia and asteriopia, or loss of vision for colors and loss of vision for form and size. Piéron would thus recognize in cases of hemianopia the following three degrees: In the lightest cases, hemiachromatopia; in more marked cases, hemiasteriopia; and for the complete cases, especially with radical destruction of the center or of the optic tracts, hemiaphotopia, or complete hemianopia.

The patient of **Cosse and Delord**, a soldier injured by the bursting of a shell, showed a right homonymous lateral hemianopia, complicated by hemianopia in the left inferior quadrant, so that three quadrants out of four in each eye were anopic. There was no aphasia, and very little hemiplegia. Altho he possessed normal visual acuity in each eye, his gait and behavior were those of a blind person. A number of bony fragments were shown by the X-ray to be imbedded in the brain. In their passage thru the brain, these bony fragments no doubt injured the region of the right and left calcarine fissures. The patient's incapacity for work was estimated at sixty-five per cent.

In a case reported by **Wilson**, a blow on the back of the head from a shell fragment was followed; first by loss of consciousness for three minutes, later by blindness for from forty to forty-eight hours, and last, as the vision improved, by concentric diminution of both fields, both for white and colors, and also a marked condition of visual fatigue, so that excellent examples of a helicoid curve were obtained with both eyes. It must be borne in mind, says **Wilson**, that concentric diminution, supposed to be characteristic of hysteria, does certainly occur from head injuries, as in two of the cases cited by **Marie** and **Châtelin**. In all of these cases there was no trace of the hysteric psychoneurosis. These symptoms are probably the expression of an organic change, the basis of which is a violent commotion, or a concussion amounting to contusion of the visual cortex, or of the subcortical visual projection system.

In a paper which considers both the organic visual disturbances, and those of a functional character which may be due to autosuggestion or heterosuggestion, both occurring in patients who have been subjected to traumatism by concussion or contusion, **Coutela** submits the following rule for the handling of these cases from the military point of view: They should not be evacuated from the front unless they have actual lesions. If so evacuated they should be kept under observation at a special center, where they should be examined by a neurologist and an ophthalmologist. No certificate of incurability should be delivered in the case of a soldier in whom the visual trouble does not correspond to clearly established objective lesions, or to a recognized organic syndrome. After the war the state may discharge these cases without compensation, but should rehospitalize them if they so desire.

**COMPLICATED HEMIANOPIAS.**—The patient whose case is discussed by **Morax** was injured in the right occipital region. His ocular symptom complex included left homonymous hemianopia, neuromyolytic keratitis, and paralysis of the dextrogyrators. The hemiano-

pia is explained by the presence of a large fragment at the level of the right occipital lobe, the keratitis by the action of a right cerebellar abscess, an extension of which affected the region of emergence of the trigeminus, and the paralysis of the oculo-gyrators either to the traumatic cerebellar lesion or to the development of the abscess in such fashion as to affect the nucleus of the sixth pair.

**Pincus's** clinical observations of shot wounds of the occiput showed optic neuritis in only three out of twenty-two cases. The intensity and extent of the functional trouble were often disproportionate to the amount of external injury demonstrable. A typical picture of homonymous hemianopia was present in eight cases. A case of optic aphasia and rightsided hemianopia did fairly well after the shot had been removed from the left occipital lobe. In a patient who presented peculiar fatigue symptoms, relatively dark portions of the visual field became absolutely dark during epileptiform fits. In a case in which there were symmetric scotomata in the left upper quadrant, radiography showed a piece of a bomb shell, not in the cortex, but in the optic radiations. The author believes that symptoms of fatigue are not always to be attributed to a hysteroneurasthenia; but may in many cases be the expression of organic injury of the visual centers.

**Von Hippel** emphasizes the need for differential diagnosis between choked disc and papillitis in every case of shot wound of the brain, wherever possible. Conditions favoring increased intracranial pressure are present after shot wounds of the skull whether the dura has been wounded or not. All swellings of the disc seen early after such wounds, although mentioned under various names in the literature, are really choked disc. The later swellings of the disc are more usually due to cerebral abscess, meningitis, or a cyst, and may be either choked disc or papillitis. Choked disc in the early stage of such injuries does not call for operation. But in cases where operation is otherwise necessary, the opportunity



is often afforded to see prompt retrogression of the choked disc. Swelling of the disc in the later stages is a sure indication that cure was only apparent, and calls for surgical intervention.

A general consideration of the subject of hemianopia is presented by **Lloyd**. He describes several cases which were connected with arteriosclerosis or nephritis, and some space is devoted to the anatomy of the optic tracts.

**Schirmer's** patient suffered for a few days only from a left sided homonymous hemianopia, from which she completely recovered. The extraordinary feature of the case was that during the attack there occurred *optic hallucinations*, principally consisting of the images of human beings all of which moved with considerable speed toward her left side and there disappeared. There was never any mental disturbance, the patient not even being of a nervous type. She was a woman of forty-five years. Schirmer, viewing both the hallucinations and the other features of the case, concludes that the lesion was located in the right occipital lobe in the vicinity of the psychopathic center, and that it was in all probability due to a thrombosis.

A case of bilateral *quadrant anopia* is described by **Tyson**. The patient was a woman of fifty-three years who had chronic interstitial nephritis with high blood pressure, and with an albuminuric retinitis. The defect was in the right inferior quadrant of both eyes, and is regarded by the author as being due to a lesion in the region of the cuneus.

**Cohen** reviews his pupillary findings in twenty-four fatal cases and fifty-one nonfatal cases of fracture of the skull. He found *inequality of the pupils* with absence of light reflex to be very common in fatal cases of fractured skull, but comparatively rare in the cases that recovered. He advises that where there is inequality of the pupils associated with unilateral amblyopia or amaurosis in the eye the pupil of which is dilated, one should recognize the possibility in this eye of subsequent descending primary optic atrophy. Contrary to the usual observation, choked disc was not observed in any of his cases.

**Weber** reports the association of cerebral degeneration and epileptiform fits with amaurosis, in an only child of Hebrew parents, at the age of six and three-quarter years. The vessels and optic discs resembled what one sees in cases of retinitis pigmentosa, but without the characteristic pigmentary change of fully developed retinitis pigmentosa. The fits were transient epileptiform of the petit mal variety.

#### CRANIAL DEFORMITY, OXYCEPHALY.—

**Bedell** describes the condition of three members of the same family, the youngest of whom showed optic atrophy, the middle one optic neuritis, and the oldest only a moderate suggestion of cranial deformity. The father of these children had died at the age of thirty-eight years from general paresis, and the mother at the age of thirty, probably from acute alcoholism. In the second of the three children, a boy of eight years, it was possible that the disease had been present at birth, altho both optic nerves were swollen at the time of examination. In the youngest child, a girl of seven years, there was advanced optic atrophy, altho there was a record of the child's head having been normal until she was past two years of age. In the second child a subtemporal decompression was done with fatal outcome in a few hours. The paper is well illustrated. A case of tower skull with double optic atrophy is recorded by **Goldenburg**, who furnishes cranial measurements. **Lewin's** paper contains records of two cases, one in a girl of fourteen years of age, who was brought to the hospital because of blindness, weakness, and enlargement of the head, and who was the tenth child in a family of thirteen children; while in the other cases, that of a boy of six years, the complaint as given by the mother was of stiffness of the neck, headache, bulging eyes, and lateral retraction of the head. In both of these cases there was marked exophthalmus and pronounced cranial deformity, the measurements of the crania being given.

**VISUAL FIELDS IN PELLAGRA.**—**Calhoun** describes the ocular findings and illustrates the visual fields in three cases of pellagra, and states that in most cases



of pellagra there is a contraction of the field of vision for form and color, with frequently an interlacing or misplacement of colors, especially the green and red; and further that in a relatively large proportion of the cases there is a scotoma for red and green and occasionally for all colors. These scotomatous areas do not necessarily occur in the typical or acute cases, having been detected in two patients before a diagnosis of pellagra had been made.

**HYSTERIC BLINDNESS.**—In the extraordinary case recorded by **Camp** the hysteric blindness had existed for five years, from the age of fourteen to nineteen years. He had been at a school for the blind for three years, and had learned to read and write by the Braille system. He was sent to the clinic because of the development of a peculiar condition in the legs which was also hysteric. Both conditions were cured, at least for the time being, by static electric treatments.

**PSYCHIC BLIND SPOT.**—**Lohmann** rejects as untenable the assumption of some physiologists that the physical blind spot corresponds to a psychic one in the psychic visual field. Altho the blind spot has been perceived entoptically, he concludes that adequate proof has not been furnished to demonstrate defect or contraction of the psychic visual field. He also discusses the relations of the space values of the retina to the point of fixation and to the blind spot.

**AN OPTICAL ILLUSION.**—Discussing the fact to which attention was called by Mizuo, that two straight crossed lines appear to be interrupted at their point of intersection and also to be bent in that region, **Nakamura** has determined that for the production of this phenomenon the following factors are necessary: The visual angle of the straight crossed lines must be from ten to fifty-eight seconds. The greater the difference in luminosity between the lines and the background, the clearer the phenomenon. The illusion does not appear if both elements represent contrast colors. The angle of intersection between the lines must lie between five and forty-five degrees. The cause of the phenomenon lies primarily in the contrast between convergence and divergence.

**HYPOPHYSEAL DISTURBANCES.**—**Wallis** gives the results of his anatomic studies of eleven subjects with regard to the relations between the optic nerves and chiasm on the one hand and the sphenoid bone on the other. In no case did the chiasm rest entirely upon the optic groove. In one instance rather more than half of the chiasm rested upon the optic groove and the olivary eminence, and the posterior half on the pituitary body. In another case the chiasm was far enough forward just to touch the olivary eminence. Wallis concludes that the chiasm is nearly always completely posterior to the optic sulcus. The measurements of the chiasm varied from seven millimeters to eleven millimeters anteroposteriorly, and about three millimeters less laterally. The intracranial part of the optic nerves varied between seven and twelve millimeters in length, and the angle formed between the two nerves was more acute with a more posterior situation of the chiasm. When the chiasm was relatively far forward the angle became U-shaped.

**Walker** and **Cushing** record eight cases of *homonymous hemianopia* due to hypophyseal tumor. In some of the cases remarkable improvement in vision followed the transsphenoidal operation. But taken altogether, the results from operation as regards improvement in vision were not so satisfactory in this group as in the bitemporal class of cases. This the authors suggest is accounted for by the fact that most of the lesions in the homonymous group are tumors rather than strumas, and have a tendency to grow less symmetrically.

The findings by necropsy in three cases of hemianopia are recorded by **Bassoe** and **Raulston**. In the first one there had been a right hemianopia. There was a tumor (glioma) measuring three by two by two centimeters on the external surface of the left parietal lobe in the region of the angular gyrus, and another tumor of similar appearance occupied the mesial and most anterior portion of the occipital lobe and extended in the parietal lobe as far as the level of the anterior end of the pons. In the second case the chief findings were left hemianopia and partial

left hemiplegia. A metastatic carcinoma measuring five by six centimeters was found extending from the occipital pole forward to within four centimeters of the tip of the temporal lobe. The calcarine fissure was involved only at its extreme posterior end. The third patient had had a right homonymous hemianopia and a partial right hemiplegia. The postmortem findings included pulmonary emboli, syphilitic aortitis, gummata of the spleen and other regions, softening in the right occipital and temporal lobes, and edema of the brain. There was marked atrophy at the pole of the left occipital lobe, the softening in the calcarine region extending inward to the ependyma of the posterior horn.

Traquair's series of papers on bitemporal hemianopia constitute an important brochure on the subject. An ample bibliography is furnished, twenty-four case histories are related, and there are numerous illustrations. The author arrives at the following conclusions: The perimetric defects in bitemporal hemianopia follow a typical or normal course of development. Commencing in the upper outer quadrant, the field is involved in a circular manner, the loss proceeding clockwise in the right field and counter clockwise in the left, so that the upper nasal quadrant remains longest. This is the course in the majority of cases. The central defect develops in like fashion. This type of field defect is due to interference with the chiasmal fibers, but is largely independent of the exact nature of the ultimate cause. The immediate cause is very probably a chiasmal neuritis, a lesion comparable to that which occurs in retrobulbar neuritis. The cause of this neuritis is not definitely known. In many cases it is probably due to pressure. It may be due to contact of toxic substance with the chiasmal fibers, which substances may either be derived from the causal lesion or arise indirectly from pressure. In some cases the chiasm may participate directly in an inflammatory process. The relation of the infundibulum to the chiasm is probably important. In tumor cases and probably in some

others, the disturbance may be due more or less to mechanical pressure. In the later stages the normal type of progress of the field changes may be "swamped" by pressure effects and are greatly altered. The cases cited provide evidence from the clinical side in support of the looped arrangement of the fibers in the chiasm. They may also indicate that the papillomacular bundle forms a little chiasm within the chiasm and that its fibers are similarly arranged.

Blum reports briefly three cases of pituitary disease in which radiographs showed either an enlargement of, or changes around the sella turcica. In the case reported by **Elsberg** and **Krug** the X-ray failed to show any enlargement of the sella turcica. There was only temporary improvement after decompressive craniotomy; but rapid improvement after pituitrin treatment, with complete relief not only of the cachexia hypophysopriva but also of the hemianopia.

The patient whose case is recorded by **de Schweinitz** and **How**, a woman of fifty-one years, had suffered since early life from intense headaches which were unaffected by any ordinary treatment. Her eyes had been under observation for fifteen years without showing any pathologic condition. There was blurred vision, and marked pallor of the optic discs. Bitemporal hemianopsia and an X-ray picture showing an enlarged sella turcica, suggested the presence of pituitary body disease. Operative interference being declined, treatment with thyroid extract and pituitary body extract was resorted to. A total of about seven thousand grains of the combined tablets (two and one-half grains each) was taken between July, 1914, and February, 1916. The visual fields were gradually restored practically to their normal extent, the vision of the right eye being raised from 6/60 to 6/5 and that of the left eye from 4/150 to 6/12. The headaches and other symptoms had practically entirely disappeared.

A similar result was obtained by **Timme** in a woman of twenty-three years, who after the visual fields had



returned to normal two years from the beginning of treatment, found it occasionally necessary to combat drowsiness and headaches with small doses of pituitary and suprarenal gland.

In **Parker's** patient sellar decompression with removal of a portion of the pituitary stroma was followed after five days by gradual return of vision, and on the eleventh day central vision was normal and the fields had returned to normal with the exception of an inferior nasal notching. The patient was subsequently kept on pituitary extract five grains three times daily.

**Tenner** presented a case of hypophyseal disease which had been operated upon by Cushing thru a trans-frontal osteoplastic opening. Seven weeks after operation the vision of the right eye had increased from hand movements in the upper nasal quadrant to 20/30, that of the left from 20/20 to 20/15, and the fields had almost returned to normal.

**Kanavel's** paper upon cysts of the hypophysis states that these are the most satisfactory type of tumors of the hypophysis, since operation upon them is technically more simple and the results are superior to those obtainable in the adenomata and other solid tumors. To secure the greatest benefit it is necessary that the tumor should be removed before the onset of puberty. At present, however, the disease is usually recognized by a group of symptoms present some years after puberty. Of the three patients which have been operated upon by Kanavel, two have already been reported.

In the first, a youth of eighteen years of the typical Froelich type of hypophyseal disease, suffering with marked signs of intracranial pressure, six years have now elapsed since the successful operation, the essential part of which was curettement of the cyst. This patient was fed for three years on pituitary extract. There was a distinct but not normal growth of hair, but no evidence of growth in height or size, no

appearance of genital function, and no apparent growth in the size of the testicles. The voice did not become more masculine. The excessive adiposity subsided, and the urinary function was restored to normal except that the sugar tolerance remained above normal at the end of two years.

The second patient, a female of twenty-one years, with the Froelich type of hypophyseal disease, and blind in one eye, developed a streptococcic meningitis and died. The third patient, also of the Froelich type of disease, who came complaining of headaches and failing eyesight, finally recovered after three successive operations with evacuation of a cyst in the sella turcica, following the last of which he developed a basal meningitis which threatened his life for a number of days. This patient became free from his recent acute symptoms, but did not show any development sexually.

The paper is profusely illustrated with drawings showing the steps of the intranasal operation as now done by Kanavel. No matter what method of approach is used the operation is said to be difficult and should be undertaken only after thorough preparation. A temporal decompression for hypophyseal tumor is the subject of a clinical talk by **Speed** before the Chicago Surgical Society.

The subject of pituitary disease is touched upon by **Zentmayer** in an address on the eye and the endocrine organs. **Fisher** describes a case, which in successive pregnancies showed evidences of raised intracranial pressure, including double papillitis, vomiting, severe headaches, and paralysis of the left external rectus muscle, as well as a partial but quite definite hemianopia. This group of symptoms was attributed by the author to an exaggeration of the enlargement of the pituitary body which is normal to the period of pregnancy. Cases of suspected tumor of the pituitary body are recorded by **Hansell** and by **Hughes**.

*(To be Continued)*



# DIGEST OF THE LITERATURE.

## VISUAL TRACTS AND CENTERS

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(Continued from August issue)

**TUMORS.**—In a review of seventy cases of brain tumor, in the surgical service of Halsted at the Johns Hopkins Hospital during three years and four months, **Heuer** and **Dandy** emphasize two possible causes of late interference in brain tumor cases, namely, uncertainty as to the prognostic significance of choked disc, and the assumption that intracranial lesions are commonly of syphilitic origin. Ten per cent of the patients were blind on admission, and in four others vision was almost gone.

The authors believe that the adoption of the principle that, even in the absence of localizing signs, surgical measures should be contemplated as soon as choked disc can be diagnosed, would in large measure prevent blindness. The time during which choked disc may persist without causing permanent damage to vision is indeterminate. The demonstration of normal visual acuity, as usually tested, should not be taken as an indication of the absence of visual disturbance, which can often only be demonstrated by careful perimetric examination. Contractions in the color fields occur before alterations in the fields for form, and both may occur long before visual acuity as ordinarily tested is demonstrably affected.

In the authors' experience the occurrence of cerebral syphilomata is relatively uncommon as compared with that of true tumors. In the forty cases certified by operation or autopsy only a single case of dural gumma occurred. The Wassermann test was made in fifty-three cases and was negative in fifty. Of the three positive cases, in

one the lesion proved to be a gumma, in one a glioma, and in one it was not certified. Syphilis and true brain tumor may coexist. The chief usefulness of the Wassermann reaction in intracranial conditions, with choked disc and demonstrable impairment of vision, is as a guide for postoperative treatment.

**Knapp** reports a case in which the brain showed a frontal tumor in an enormously enlarged right lobe, which had produced a sacculated distension of the third ventricle and pressure atrophy of the underlying bone in the anterior and middle cranial fossae. Bilateral central scotoma and excavation of structures anterior to the anterior clinoid processes, as shown by X-ray, suggested a definite localization of the tumor at the base of the frontal lobe; but autopsy showed the tumor to be situated at the convexity of the right frontal lobe next to the falx. In a discussion of lesions of the frontal lobe simulating cerebellar involvement, **Gordon** comes to the conclusion that so far as his cases of cyst, sarcoma, abscess, and hemorrhage are concerned, the condition of the eyes could not be taken into consideration for the differential diagnosis.

The experiments by **Sharpe** for the production of increased intracranial pressure with its ocular signs in dogs were along lines similar to those of Horsley many years ago. The condition of hydrocephalus was produced in nine puppies of the age of from ten days to two weeks. Sharpe concludes that the measurement of the pressure of the cerebrospinal fluid at lumbar puncture by means of the spinal mer-

curial manometer is the most accurate means of determining the intradural pressure; and he urges that the intelligent use of the ophthalmoscope, especially by the direct method, should be much more intensively studied in medical schools and hospitals than is at present the practice. **Lamb** presents a careful description of the antemortem and postmortem findings in a case of neuroma embryonale (glioma) of the left lateral ventricle of the brain, in which there was double choked disc.

In a discursive paper on the ocular

symptoms of brain tumor, written for the general practitioner, **Conkey** reports a miscellaneous group of cases of increased intracranial pressure due to a variety of causes. Five cases of intracranial growth are recorded by **Lemere**: In two of them it was possible to localize the tumor absolutely, and in two cases also a decompression operation was beneficial as to vision and other symptoms and probably prolonged life. A review of the eye, ear, nose and throat symptoms manifested in brain tumor is offered by **Kiefer**.

## COLOR VISION.

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This section reviews the literature from January, 1917, to June, 1918. Related topics are considered in the sections on Retina, and Visual Tracts and Centers.

In presenting a resumé of the recent investigations into the subject of color vision, it is not possible to detail here all the facts, physical, physiologic and psychologic, in support of the theories of vision, yet a summary of the important papers now obtainable by the reviewer will be given.

While discussing the apocritic principle and the evolution of visual perceptions, and commenting upon the complexity of the visual functions, **Parsons** calls attention to the fact that the estimation of colors in the field of vision depends not a little upon the intensity of the illumination—the greater the illumination the wider the extent of the field; while under normal conditions there is a peripheral totally color blind zone separated from the central trichromatic area by a dichromatic zone.

The purpose of **Edridge-Green's** paper on the relation of ophthalmology to the theory of vision is to show that every possible aberration of function is represented by a disease of the eye. Vision being photochemical, there should be defects in accordance with

known photochemical facts. The rods having the special function of regulating the photochemical sensitiveness of the liquid surrounding the cones, there should be diseases corresponding to aberration of this function. The visual impulses are set up by the decomposition of the visual purple generated by the rods, acting upon the cones and the impulse itself is conveyed thru the optic nerve to the brain. The character of the stimulus differs according to the wave-length of the light causing it.

In the impulse itself there is the physiologic basis of the sensation of light and in the quality of the impulse the physiologic basis of the sensation of color. The impulses vary in character according to the wave-length of the light causing them, altho the retino-cerebral apparatus cannot discriminate between the character of the adjacent stimuli from lack of development, the power of discrimination varies with individuals and hence the different varieties of color perception which are found.

With reference to erythropsia the well known facts connected with the

maximum of the luminosity of curves varies according to the intensity of light stimulus. Bright light intensifies the red end of the spectrum, while feeble light the violet end. Hence erythroptasia depends upon the influence of very bright light upon the red end of the spectrum. The reversal of color fields depends upon photochemical decomposition of the fluids surrounding the cones, which has been sensitized by visual purple, as well as upon the stimulation of the cones by the products of this decomposition. Red light is not nearly so active in bleaching the visual purple as green or blue, yet when it produces an effect its action is greater. In hyperesthesia of the retina, as in hysteria, we frequently find the red field larger than the blue. He calls attention to Stephenson's observation in regard to the transposition of the red and green fields in xerosis of the conjunctiva, in which the retina is torpid, hence the action of red is more affected than that of green.

**Berry** in his Bowman Lecture, has endeavored to reduce the discussion of the subject of color sense phenomena to a more definite mathematical formula than has hitherto obtained. He concludes the chain of events leading to color perception may be taken to be something like the following: 1. Biochemical action of rays on the contents of the retinal pigment cells, possibly combined with an indirect light on the retinal cones, thereby. 2. Stimulation of the dual nature of the cones. 3. Nerve conduction from the double cone stimulation by the optic nerve. 4. Central normal cells, in which the combination of the two factors causes different molecular disturbances, which are: 5. Psychically resolved into mental and color sensations.

Further conclusions that may be drawn are: 1. That the existence of fundamental color sensation is improbable. 2. That the transition from polychromatism to dichromatism is more easily explained than is the assumption of a lost or crippled fundamental sensation. 3. That psychologic and congenital dichromatism are essentially the same in causation. 4. That the mole-

cular disturbances in the central visual cells are the same whether evoked by physical stimuli or originating subjectively. 5. That there is a constant interaction taking place between the molecular movements in these cells in contiguous areas, an interaction known as induction, which seems to be independent of the manner in which the disturbances are evoked. 6. That the relation between mental and colored light perception, tho intimate, is not inseparable. 7. That the retinal rods and the visual purple are probably unconnected with color sensation. 8. That the psychical processes evoked by molecular changes in the visual center are subject to other psychical conditions, which may falsify judgment.

**COLOR BLINDNESS IN THE PERIPHERAL RETINA.**—**Ferree** and **Rand**, citing a notable case as a text, and the investigations in their study of the color sensitivity of the peripheral retina, confirmed the findings of other observers by discovering in the normal retina areas which are totally blind or deficient for the colors red, green, yellow or blue. They believe that the presence of such spots in the peripheral retina may be considered the rule rather than the exception, altho there may be some difference in the findings of various observers as to the number of the spots, their location and color responses affected.

In their search for the spots a rotary campimeter was used as a means of presenting the light to the different parts of the retina and pigment papers and spectral light in a very intensive stimulation. All colors did not react equally. Lights of a given intensity were sensed as color clear out to the limits of white light vision, for all the colors except the green, yet green could not be made to coincide with the limits of white light vision no matter what the intensity might be. As might have been expected, the only effect of these greater intensities was to narrow the area of the spots previously mapped by means of the pigment paper stimuli; from which, they concluded that the blind areas are frequently bounded by a zone of weakened sensitivity.



During their observations care was taken to keep the intensity of the illumination of the room constant. In the case cited the after images were found to be greatly modified from what had commonly been the case. Ferree and Rand learned by their studies that there was no detectable weakening of the sensitivity to the complementary or antagonistic colors in the areas, and that no more of the color to which the area was blind was required to combine to produce gray with the antagonistic or complementary color, than was needed on the normal areas of the retina immediately adjacent.

In connection with Ferree and Rand's publication, **Ives'** study of the photometry of lights of different colors should not be neglected by those interested in the subject. His observations are of great theoretic and practical importance. His work on flicker photometry reaches a very high standard. Combining his earlier studies he has recently published, in collaboration with Kingsbury, a paper dealing with the theory of the flicker photometer under asymmetric conditions.

**NEUTRAL ZONES IN THE SPECTRUM.**—Studying, by means of a Rayleigh equation, the perception of the spectrum by persons having a normal or approximately normal color sense, **Malling** found all grades of transition from the most highly developed color sense to complete color blindness. Especially he found neutral zones, or bands of relatively weak color perception, at different points in the spectrum. The most frequent of these (12 out of 25 cases) occur in the blue green at wave-length 502; and in the red wave-length 658, 13 cases.

These he regards as relatively weak points of color perception. In many of the distinctly color blind this blue green zone is extended, until in the completely color blind it occupies the whole spectrum.

**VISUAL STIMULATION INTENSITIES.**—**Troland's** paper, which has been written for the experimental psychologist, is a discussion study of certain very general questions with regard to the measurement of the intensity of the

visual stimuli. In discussing the problem of heterochromatic photometry, the author states that photometry in general is really color photometry, since none of the light sources are strictly white and even sunlight varies in hue. The brightness of an illuminated surface depends upon the point of view—by brightness is meant the effect of a given stimulus on a given eye.

When lights of different colors are compared, the brightness must also depend upon the visibility curve of the eye, but this visibility curve will not be the same for different methods of heterochromatic photometry. In his argument the author is inclined to accept the flicker photometer as affording a means of relatively precise comparison between light of all degrees of color difference, yet in proceeding by the flicker to test the value of a visual stimulus, it has been demonstrated that equally bright lights do not always generate equal luminosities.

**Arps** found that the perception of grays is conditioned by attending circumstances, for when composed of the color wheel under a given illumination, they did not remain indistinguishable if the objective illumination was made very faint. Under certain conditions it was found necessary to add a white sector of 25 per cent to the gray composed of blue and yellow, in order to restore equality in brightness. In another experiment two grays matched in daylight were broken up in the dark room and markedly affected by decreased illuminations. Again, they were affected by the character of the contrasting background, as was shown by transposing two rings of gray, the effect being always greater on the outer ring. Especially were changes observable when white card board was placed behind the color. Indistinguishability disappears, therefore, with changed conditions of observation.

**Gibson** bases an explanation of color and color vision upon the hypothesis of electrons, tuned to respond to various rapidities of ether vibration. In the retina these may be conceived to set up chemical changes which in turn give

rise to the nerve impulses interpreted as color. Absence of electrons capable of responding to a certain rate of ether waves would account for the inability to receive a corresponding color sensation.

**TESTS FOR COLOR BLINDNESS.**—**Bos-tröm, Göthlin** and **Ohrvall** review the status of the question of color blindness and compare what obtains in Sweden with other countries. The methods of examination used on the chief railway systems are analyzed and the imperfections noticed. They have devised a test method which they believe will correct the imperfections of the tests now in use, the chief item of which consists of a chart on which are scattered tiny irregular patches of color, of a light and a dark reddish lavender and a dull cherry red. All the dull red patches are arranged in such a way that they form a large figure, 3 or 6. The tones of the red and the lighter lavender being of the same depth the figures cannot be distinguished unless the examinee is able to mark the difference between the red and lavender.

Two of the charts are reproduced and tests with other colors are described. The test here adopted was the most satisfactory. The figures on the charts are to be called aloud, but only 20 to 40 seconds are allowed for the reading of each chart. As the figure is read the outline of it is to be traced. In these charts the figures are very much alike, differing only by being either lighter or darker. The authors make a strong plea for a standardization of color tests and offer a model equipment and outline the procedure of examination.

This plan is essentially similar to that devised by **Ishihara** and described last year (*Y. B. v. 13, p. 264*). His isochromatic plates have been increased in number to sixteen, and arranged in book form, with explanatory text in English.

**TOTAL ACHROMATOPSIA.**—**Wernicke** reports two cases, occurring in brothers, aged 18 and 12 years. The color blindness was complete with some shortening of the red end of the spectrum, red being seen as black. Central vision was greatly reduced, one-

tenth to two-tenths. Daylight provoked continual blinking. If the eyes were kept open in a strong light, after a few moments everything appeared white. Vision was improved at dusk. Nystagmus was present. There was low ametropia, but its correction did not help the vision. These patients distinguished colors to a certain extent by their respective brightness. Ophthalmoscopically the eyes were normal.

**Landolt**, in an extensive account of this rather rare syndrome, found the subjects of it to be hyperopes to the extent of 4 or 5 diopters with astigmatism, and to be amblyopic to a degree not correctable by appropriate glasses. They have had nystagmus also of moderate amplitude of the rotatory type. In the study of the fields of vision it has been noted quite uniformly, that while the extent of the peripheral fields has been ample there have been more or less pronounced small central scotomata. It has been difficult to map out the scotomata because of their smallness and because of the difficulty in maintaining fixation by reason of the nystagmus, and because of the lack of intelligent cooperation of the subjects in the course of the perimetry.

The patients have complained of photophobia and have been the subjects of nyctalopia. The nyctalopia (night seeing) has been of especial interest. It has appeared to be associated with the marked sensibility of the retina to the light, accordingly, the photophobia has been a constant accompaniment. The subject is able to see, not in absolute darkness, but in the increasing twilight to a degree not attainable by the normal sighted. Normal persons require from 15 to 20 minutes for adaptation, whereas the achromatope can see at the end of 2 minutes.

In the testing of the color sense the subject is not asked to name the colors but is to accept a test-skein, a red, for instance, and to select from a pile of many colors reds and allied colors. The color blind will hesitate, will make frequent comparisons and numerous mistakes, selecting the skeins at random.



On his sensorium the colors make only the impression of light.

He cites the case of a soldier, and illustrates his paper by a colored plate showing the bands of colors and a photographic black and white reproduction, of the lot selected by him. In the examination by a projected spectrum, while his perception of the red end might be somewhat shortened, the most luminous division green, the normal will appreciate yellow as the most luminous. In subdued light the region occupied by the greens will be luminous but to the normal they are obscured.

The author then philosophises on the composition of color, breaking it up into saturation and light, the proportions determining the value of the color. An ordinary photographic plate is sensitive to light only of varying degrees, depending upon the obscuration by the color quantity. He ascribes to the retina three principal functions: sensibility to light, to color and visual acuity. Light sensibility is greatest at the periphery and gradually diminishes towards the fovea. Color is perceived most strongly at the fovea and least at the periphery. Acuteness is at the maximum in a limited area at the fovea and diminishes towards the periphery.

All these functions depend upon the anatomic arrangement of the rods and cones—the cones are greatest at the fovea, least at the periphery—the rods are greatest at the periphery and least at the fovea. To the cones belong the property of visual acuteness and the color sense, while light is perceived by the rods. The achromatopes are therefore destitute of cones, and, in other words, can be likened to normal persons in the dark; who are in a sense nyctalopic, for when a bright light is suddenly flashed from out of the darkness, are seized with photophobia and a central scotoma is developed.

When the normal eye is adapted for darkness, under certain conditions as to lighting, the colors make the same impression on the normal as they do on the achromatopic eye. The difference between the retina adapted to ob-

scurity, and the retina illuminated, is in part due to the retraction of the pigment, which protects the nervous elements, and in part to the presence of an abundance of visual purple.

The author ventures to suppose that the nystagmus depends upon the efforts to present the images on the parafoveal regions, and thereby compensate for the central scotoma. Accordingly he regards the nystagmus to be peripheral in origin.

To those who are interested in the subject of color vision, the Editor would recommend the perusal of **Abney** and **Watson's** important paper on the threshold of vision for different colored lights; and **Houston's** interesting theory of color vision, based on the analogy of the selective action of the eye to the forced vibrations of a pendulum.

**COLOR SPECTRA IN THE AGED.**—In a communication to "Nature," **Brudenell Carter**, now in his 89th year, stated that he has noticed, for some time past, before his eyes when directing his gaze upon bright lights, colored spectra in the shape of concentric circular bands—red external, blue internal and yellow intermediate. When the light is near, and so strong as to contract his pupils, the spectrum does not appear, and in like manner the circle is obliterated when he looks thru a pin hole opening.

His refraction is moderately hyperopic and astigmatic, but his spectacle lenses fully correct his visual defect, and he is able to read brilliant type. His color sense is not defective and he has not cataracts. He regards the phenomenon, which has been complained of by other octogenarians, to be dependent upon altered refraction in the crystalline lenses thru the changes commensurate with his advanced age.

Rhineberg, in commenting upon **Carter's** communication, assumes that the cause of the spectra is in some way due to diffraction. The appearance of the blue and red bands, and the diameter of the colored circles increasing in size in ratio to the distance of the light viewed, point to this; both their appearance when the pupil is widely



dilated and their disappearance when the pupil is contracted. He quotes Tyndall's opinion in a case in which the philosopher ascribed the colors to minute particles in the humors of the eye, the increase in size of circles and the vividness of the colors indicated that the diffracting particles were becoming smaller and that they might finally become absorbed.

This explanation Carter does not accept, but clings to his idea that the phenomena are due to lenticular ineffi-

ciency. He cannot account for the presence of a cloud of particles in the ocular media of perfectly healthy, effective organs. He maintains that the occurrence is due to changes inherent with advancing years, for it is not probable that the cloud, if it existed, would be of similar density in the two eyes, or that it could exist without impairment of sight. In his own case the color circles of the two eyes are of equal size and brightness.

## THE EYEBALL.

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This covers the literature of 1917 and to June, 1918. Related matters will be found in the sections on Uveal Tract, The Orbit, and Injuries.

**ANOPHTHALMOS.**—Many cases of this anomaly, formerly considered rare, have been described in the literature of recent years. However, the reports of true anophthalmos, when even a rudimentary eyeball can not be found by dissection of the orbital contents are rare. Zehender denied that a true anophthalmos may exist, stating that in all clinically observed cases of this anomaly, the absence of the eyeball was only apparent, a rudimentary mass or a vestige of the eyeball being always found by means of careful dissection.

**Villasevaglios** has had the opportunity of seeing a child affected with this anomaly, who died two days after birth. He was able to make also careful craniometric measurements. The child was born at term and well developed. The skull was conical, the forehead very high and the superciliary regions and cheeks protuberant; concealing the orbits and lids on both sides and giving the child the aspect of being asleep. By separating the tissues, a small palpebral aperture could be detected, with lids and some cilia. Behind them was a small cavity lined with conjunctiva, in which no trace of the eyeball could be detected.

Craniometric measurements showed an extreme reduction in the size of the orbits, whose horizontal diameter measured only 15 mm. and the vertical 7 mm. The normal orbit of the new born being respectively 35 and 30 mm. Complete measurements of the skull are appended.

**Matson** reports another case of anophthalmos, in which neither on inspection or palpation any trace of the eye, or any mass whatever, could be found in the pocket lined with mucosa, which existed in both orbits. Lacrimal fluid existed, probably from the conjunctival glands, as the presence of a lacrimal gland was not evident. A supraorbital notch existed on both sides. No history of heredity could be elicited.

In the discussion of the case Jackson said, it was the most complete anophthalmos he had ever seen. The orbits were very small altho the lids, cilia and conjunctiva showed some degree of development. He could not find any eyeball, altho there might be some embryonic structures at the apex of the orbit. In his opinion the superficial structures are an index of the development of the optic nerve, and since the

lids, cilia and conjunctiva are developed in this case, there must be some rudimentary optic nerve.

McKeown mentioned a case he had under observation, of a baby nine months old with a very rudimentary eye, and asked if the use of a glass shell would help the proper development of the orbit and face. Jackson and Spencer answered in the negative.

Davies contributes an interesting report of five cases of anophthalmia and microphthalmia, and dwells upon the causes of these defects. His first case was a unilateral anophthalmos in a child six weeks old. There was a mucopurulent discharge from the right orbit, which was small and diminished in depth, but otherwise appeared to be normal. The palpebral fissure was only 7 to 8 mm. wide, and occupied the inner half of the lids. The puncta lacrimalia were both present, and a few cilia were present in the upper lid. No eye ball could be detected in the orbit. The conjunctiva was puckered up a little at the apex, where there was a tiny nodule, scarcely the size of a pin head. The presence of this nodule and the lack of dissection makes the author's classification doubtful.

There was, in addition, a marked deformity of the right ear, the external auditory canal being closed and the pinna absent. The face was very asymmetric and when the child cried the mouth was drawn to the left and the facial muscles paralyzed. A small nodule of skin existed on the right side of the neck, a little below and behind the angle of the jaw, which probably marked the position of the posterior extremity of the second bronchial cleft. Otherwise the child appeared healthy. No history of consanguinity.

This case was observed again, four years afterwards, when the right side of the face had grown in proportion with the left and there was no marked facial asymetry. The facial paralysis still exists. Sound was not appreciated in the right ear.

The second case had a bilateral microphthalmia, with the striking feature of a markedly oblique position of the palpebral fissures resembling the orien-

tal type, altho the parents were not of foreign extraction. The right eye was extremely small and both presented coloboma of the iris and choroid. An internal, bilateral nonparalytic squint, associated with lateral nystagmus on fixation, could be observed.

In the third case microphthalmia was more marked in the left eye, in which the palpebral fissure appeared narrower. An incomplete coloboma of the iris was present and a persistent pupillary membrane obscured the fundus. The right eye had coloboma of both iris and choroid, involving the disc. Vision: R. 6/24 under atropin and with +3.5 D. Sph. The palpebral fissures were somewhat oblique, especially the left. No history of consanguinity.

The fourth case presented unilateral microphthalmia with small and inactive pupil, iris discolored and opacity of the lens. No coloboma of the other eye or any other deformity.

Case fifth showed a minor degree of microphthalmos in both eyes, with coloboma of the iris, choroid and optic nerve. Marked lateral nystagmus was noticed since birth.

Davies thinks that anophthalmos is of the same pathologic type as microphthalmos but of greater degree: Because the latter is associated with definite structural defects in the eye due to faulty development or actual failure of development. It is probable that both are dependent on a cause or causes more or less similar in each type.

He groups these causes under four headings: 1st. Inherent defect in the germ plasm itself. 2d. Some condition in the environment of the cell germ, before or after impregnation which is injurious to its proper development. Similar conditions may also exist in regard to the sperm-cell. 3d. Inflammatory or degenerative changes in the eye occurring at a very early date. 4th. Any two or more of these causes may be active in the same case. The author discusses all the primary factors underlying congenital deformities, and does not declare himself in favor of any special theory, considering the question an open one.



**TRAUMATIC PANOPHTHALMITIS.**—Numerous bacteriologic researches have been made in late years in the etiology of traumatic panophthalmitis. These have demonstrated that the most frequent forms are produced by the common pyogenic germs, amongst which pneumococcus is the most frequent. The germs which normally exist on the conjunctiva and the borders of the lids infect the eye, passing thru the wound into the vitreous.

There are, however, other forms of traumatic panophthalmitis such as those observed by **Pereyra**, in which the inflammatory symptoms begin a few hours after the injury and take on a tempestuous course. They are produced by the inoculation of different bacteria which are conveyed into the eyeball by the injuring instrument. These bacteria generally live in a saprophytic way in the air (*bacillus subtilis*, *bacillus perfringens*, etc.), but they become highly pathogenic when they reach the inner part of the eye.

In the author's first case panophthalmitis was due to a lacerated wound of the cornea made with the tip of a whip. The inflammation was of the hemorrhagic type, without pus, and the eye rapidly atrophied and was removed. Smears and cultures proved the panophthalmitis to be due to a *bacillus coli*, highly pathogenic, and to *bacillus subtilis*.

In the second case a wound of the cornea was made with the tip of a wire and a violent purulent panophthalmitis developed. Smears and cultures showed the association of a *bacillus coli* also very pathogenic, with a variety of *bacillus proteus* slightly pathogenic.

**Allport** performed a successful irrigation of the vitreous body in a case of wound of the eye with retention of a piece of metal, which resulted in traumatic panophthalmitis, when the patient absolutely refused enucleation. He made first a magnet operation thru a scleral incision and removed the foreign body from the vitreous. Observing a considerable quantity of pus exuding from the wound it occurred to the author to irrigate the vitreous, which he did using a large anterior

chamber irrigating syringe and removing an appreciable amount of pus. An iridectomy was afterwards performed downward, and the hypopyon washed out. The vitreous was syringed again so thoroughly that the salt solution came out thru the coloboma of the iris and the corneal wound. The eye quieted and three months afterwards the inflammation had entirely subsided and the tension was increasing. The lens became cataractous.

**METASTATIC PANOPHTHALMITIS.**—**Pi-card** reports 96 cases of panophthalmitis observed at Dor's Clinic, of which several are personal, and reviews the most advanced opinions on the subject. Metastatic panophthalmitis may be produced by infections of "surgical, medical or obstetric origin." He reports 21 cases (among 96) of surgical septicemias, which were frequently associated with suppurating joints, pyelonephritis, erysipelas, paronychia and wounds of the limbs. After these came surgical infections from the digestive apparatus, and last and very rarely those of the pulmonary system.

Panophthalmitis following medical infections was seen in 41 patients. It is more frequent after pulmonary diseases: pneumonia, bronchitis, bronchopneumonia and in gripe. Then come genitourinary diseases and at last digestive disorders. Eruptive fevers, a majority of contagious diseases, typhus, and diseases of metabolism are exceptional. Obstetric infections produced panophthalmitis in 33 patients, ranging second after medical infections.

The most common pathogenic agent in medical infections was the pneumococcus. According to the author's experience the first symptom of the infection is a subjective one: the rapid deterioration of sight, which may be entirely lost in one or two days, in the streptococcic forms, and in three or four in the pneumococcic or other bacterial septicemias. Spontaneous perforation of the globe occurred in 30 per cent of the cases. In 85 per cent the disease was unilateral. Death rate reached 49 per cent in obstetric pan-



ophthalmitis and 33 per cent in surgical cases.

**Cohen** describes a case of unilateral panophthalmitis associated with puerperal sepsis and multiple abscesses thruout the body, in which the examination of the blood revealed the streptococcus hemolyticus. Smears and cultures from the contents of the eviscerated globe showed the same micro-organism. The author points out that, contrary to the majority of cases, the ocular involvement was a nonspecific localization, as evidenced by the multiple abscesses and the unilaterality of the infection.

**Vest** observed another case of unilateral streptococcic panophthalmitis after puerperal sepsis, and **Stapleton** reports a third in which the sepsis was of slight degree, the blood examination revealing only saprophytic bacteria; but the contents of the eye and the discharge from the uterus showed numerous streptococci.

**Siredey** and **Martin** had occasion to observe a case of double panophthalmitis after a very severe cerebrospinal meningitis. The eye manifestations appeared very early, the fourth day in one eye and the fifth day in the other, after the onset of the meningitis. Abundant exudation was formed behind the corneas, which were from the beginning uniformly opaque. The patient died a few days later. **Netter** thinks that the position of the patient has considerable influence in determining the eye which is affected: the side on which he lies for a longer time being the first involved.

**Lawrence** details a case of bilateral metastatic panophthalmitis with fatal issue, following pneumonia. The smears and cultures of the contents of the eye showed pneumococci and streptococci. The author points out the gravity of these mixed infections in which almost always death ensues. He advises the use of serobacterins or a specific serum.

Dr. Wendell Reber, in discussion, agreed with the advantages of sensitized serobacterins and emphasized the dangers of vaccines which being foreign proteins are capable of doing

much harm. He also called attention to sinusitis as a possible cause of panophthalmitis, the venous communications between the large plexus at the apex of the orbit, and the veins of the sinus being by way of the nasal vein, which has no valves. Many cases have been reported of panophthalmitis following tonsillitis or otitis media. Culp suggested that the involvement of the middle ear and later of the lateral sinus may produce a panophthalmitis.

**Kusama** and **Nakayama** found in the enucleated eye of a soldier, in whom an endogenous panophthalmitis appeared spontaneously accompanied by febrile symptoms, pseudodiphtheria bacilli and staphylococci.

**Oguchi** describes a new bacillus which he considers the cause of a panophthalmitis following an infection by way of an adherent leucoma. The organisms were short, thick rods, similar to bacillus coli, encapsulated and Gram negative; but without any gas formation.

**SPONTANEOUS EXPLOSION OF ARTIFICIAL EYES.**—**Metz** has observed a new case of self destruction of a Snellen artificial eye. As usual the patient heard a sharp report, but this time he thought he had been shot, the bullet striking his artificial eye. Inspection revealed no injury of the lids. The attempt to remove the eye was attended with some difficulty and a slight bleeding occurred from the posterior part of the conjunctiva, which showed an irregular round opening of about 5 mm. in diameter. In the interior of the eye there were a number of small fragments of glass. It is probable that when the globe ruptured the conjunctiva was drawn into the eye by virtue of the vacuum which existed inside and injured itself. This explains also the difficulty in removing the glass ball from the socket. Regarding the cause of the explosion the author refers to the work of Rochester (see O. Y. B., v. 13, page 277).

**DISLOCATION OF EYEBALL.**—**Greig** reports a very curious case of idiopathic dislocation of the eye ball in a marasmic child, eleven months old and weighing seven pounds. She screamed

incessantly and it was noticed that when crying all the voluntary muscles, (including the orbicularis palpebrarum on both sides), were thrown into a state of convulsive movement; while at the same time the eyeballs were protruded to such an extent that dislocation appeared to be imminent. When the fit of crying was more violent than usual, or with the slightest touch on the outer canthus, the left eyeball was protruded with a jerk out of the orbit between the lids. The globe could not be voluntarily retracted, but was quite easily replaced by a little pressure. The skull had a normal size and contour and there was no trace of hydrocephalus. The orbits, as far as could be ascertained, had normal size and depth and the globes were not unduly large. During sleep the eyeballs showed no projection.

**EVISCERATION.**—**Dimitry** insists in his plea that evisceration and simple

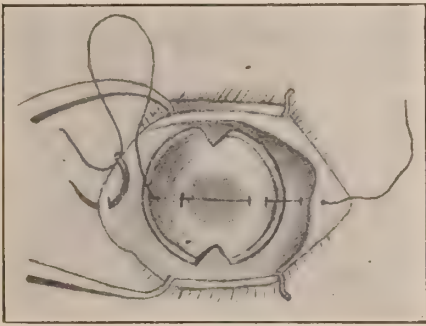


Fig. 1. Dimitry's method of passing the suture after evisceration of the eye.

enucleation are unsurgical procedures, (see *O. Y. B.*, v. 13, pp. 273 and 275), and describes at length the method of evisceration of Hall and Husinger. To eliminate dead spaces after resecting the posterior one-fourth of the sclera and severing the optic nerve, he passes the sutures in the manner shown in the illustration (Fig. 1).

**Hall** details also the same method, which he devised since 1908, and advises to insert in the scleral cavity a small gauze drain which is withdrawn after twelve hours.

**Dianoux** considers evisceration superior to enucleation for war injuries.

It is easier to perform a transverse incision a little forward from the insertion of the muscles, mopping out of the contents of the eye with a piece of gauze wrapped on an applicator, and a drain left for 24 hours in the cavity is all that is necessary. This avoids pain and drains the fluids so abundant at first. Nonexpert hands can do it much better than enucleation, in which cutting again and again behind the globe to sever the optic nerve is a common occurrence. After evisceration the shell is applied by pressure of the air instead of resting upon the lower fornix, which at last produces abrasions and scars.

**ENUCLEATION.**—**Angelucci** points to the great movement now going on in France against immediate enucleation. He quotes **Dianoux**, who wrote: "Since the beginning of the war we assist in a true orgy of enucleations. Every eye with a penetrating injury, with or without consecutive cyclitis, if simply the vision is abolished, is pitilessly removed. No histories, no responsibilities. Enucleation is an operation of repose."

**Dianoux** protests also against this barbarous surgery because sometimes its only object is to shorten the stay of the patient in the hospital and to give him a minimum of treatment. **Weekers** also considers that enucleation is not justified; temporizing it is sometimes possible to save eyes which at first sight seemed completely devoted to enucleation. Sympathetic ophthalmia is becoming more and more rare by the use of aseptic methods. **De Lapersonne** indignantly protested to the Minister of Public Health, against such offences as double enucleation, practiced on the same man, wounded a few hours before.

In such a sad manner, says **Angelucci**, France is now paying the penalty of having proscribed ophthalmologic teaching from the curriculums of her universities. In Italy enucleation has been done rarely. Among 600 soldiers with wounds of the eyes sent to the rear, there were only 77 enucleations. In 510 wounded, **Angelucci** performed enucleation only 38 times. Sympa-



thetic ophthalmia is extremely rare and enucleation is not urgent, except when there is great deformity or infection, or the eye is in pieces. **Carpenter** also thinks that as sympathetic ophthalmia is comparatively rare, many eyes are sacrificed that might otherwise be of some value, at least for cosmetic purposes.

**Valois** describes a new operation for obtaining a larger and more rigid socket base after enucleation. This is of the greatest importance to effect a better transmission of the movements of the socket to the prothesis. (See *O. Y. B.*, v. 13, page 27.) The operation consists in grafting between the lips of the conjunctival wound a piece of sclerotic taken from the enucleated eyeball. This piece is cut in a rhomboidal shape and inserted folded lengthwise in the middle; keeping it in proper place and position by means of a forceps during all the process of suturing. The threads must include the two conjunctival lips and the scleral graft interposed between them. It is important that the external surface of the sclera shall be in contact with the conjunctiva.

After the operation an ebonite olive must always be inserted in the cavity. The graft has taken well in all cases. In one patient the scleral graft was obtained from the eye of another patient without any inconvenience.

**Dor** as an expert has examined 66 one-eyed men for exemption, of whom 23 had suffered enucleation and 40 evisceration. He inquired from them about troubles in the other eye and obtained the following data: 22 men complained of lachrimation, photophobia, hemeralopia, periorbital pains, asthenopia and other slight disturbances of vision. Of these 21 were eviscerated and only one enucleated. This gives for enucleation 96 per cent of good results and 4 per cent of fairly good, and for evisceration 48 per cent of good results and 52 per cent of moderately good consequences.

The author sees the cause of this slight degree of sympathetic irritation in the presence of the ciliary nerves in the scleral stump after evisceration.

For this reason he prefers enucleation and the use of a paraffin ball or a piece of cartilage according the method of **Carlotti** to improve the prothesis.

**Dimitry** ascribes the loss of tonicity of the lower lid, principally at the outer canthus; and the ptosis and drawing in of the upper lid, found sometimes after enucleation, to an injury of the sympathetic and its subsequent paralysis, produced by the dislocation of the eyeball between the lids during the operation. He does not support his views by any proofs.

**IMPLANTATION.**—Grafting of dead cartilage after enucleation is an interesting departure of the **Carlotti** method. It was practiced by **Magitot** in two cases of lacerating wounds of the eye caused by projectiles. The cartilage is kept in formalin and may be used even when a moderate infection of the socket exists. There are about 60 per cent of probabilities of success. Histologically the cartilage is insusceptible to attack by microorganisms, and its consistence makes possible the suture of the two lateral muscles, thus providing for lateral movement of the stump.

This procedure is applicable in old as well as recent cases, if the muscles are repaired in such a way that they could be picked out later. When many months after the wounding all inflammatory symptoms have disappeared nothing prevents the removal of the dead cartilage and its replacement by a piece of a living one taken from the patient himself.

Fat implantation continues to be a subject of great interest for improving the prothesis. In this year **Wheeler, Head and Key** have contributed papers suggesting changes in the technic and giving the late results of former operations.

**Wheeler** advises, before each muscle is cut from the globe, to clamp it at its insertion with a muscle forceps. After cutting the superior and internal recti, both needles of a double armed fine cat-gut suture are passed from the globe side thru the tendons near the cut ends. Then the inferior and external recti are clamped out and cut, the forceps being



left in place until the enucleation is completed. After depositing the fat in Tenon's capsule, the needles carrying the catgut suture which loops the tendon of the superior rectus are carried thru the tendon of the inferior, entering from the globe side and the suture tied. This results in a slight overlapping of the tendons. A similar maneuver is made with the internal and external recti. Then a purse string suture is made with catgut at the margin of Tenon's capsule and tied. Finally the conjunctiva is dissected a little from Tenon's capsule and sewed vertically by interrupted sutures.

Key also grasps each muscle with a muscle forceps, but before clamping it the conjunctiva is pulled forward well over the muscle attachment when the forceps is clasped firmly upon the muscle including the conjunctiva. Now the muscle is cut free and a catgut suture inserted thru the conjunctiva and muscle from without inward, and then from within outward, well back of the position of the forceps. It is of great importance to place these sutures far outward from the cut margin of the conjunctiva.

The recti are then treated in the usual manner, the fat inserted and a purse string suture of the conjunctiva tied. Across the pouch made by the purse three mattress sutures of silk are placed. The author has performed this operation 15 times with very gratifying results, except in a syphilitic patient in whom there was sloughing and absorption of the fat.

Head following the usual method, (which he credits to Lauber, of the Vienna Clinic), reports 24 successful fat implantations; 23 in Tenon's capsule, and one into the sclera after evisceration. In all of them the results were good. Two cases operated more than five years ago do not show, up to the present time, any shrinking and the excursions of the artificial eye are as good as of the other.

All of these authors agree that the stumps have perfect motility and a good prominence. The shell is held in proper position and tilt, without having to rest on the lower lid. Slow absorp-

tion may go on for years, but enough fat remain to make a good prosthesis. Head gives the credit for fat implantation to Lauber, of Vienna, and Wheeler to "a Mexican surgeon called Barraquer." As it seems there is still some misunderstanding about the originator and pioneers of this method I think it advisable to give the following data:

Fat implantation was used for the first time in 1900-1 by the Spanish surgeon Doctor Barraquer, Professor of Ophthalmology in Barcelona, both after enucleation and evisceration. His methods and results were published in the *Archivos de Oftalmologia Hispano-Americanos*, 1901. After Barraquer the writer published the report of a case of fat implantation after evisceration, with complete success (*Anales de Oftalmologia*, Vol. IV, May, 1902), and performed other after enucleation.

Barraquer's operation was immediately accepted by Mexican ophthalmologists and was made the subject of a symposium in the First Annual Meeting of the Mexican Ophthalmological Society, March, 1903. Dr. F. Lopez reported 18 successful operations, 12 after evisceration and 6 after enucleation. Dr. D. M. Velez reported also 6 operations, 4 after enucleation, 2 in evisceration and one in a contracted socket. All with success. The papers were published in *Anales de Oftalmologia*, Vol. V., April and May, 1903. Dr. O. Wernicke, of Buenos Aires, commenting on Barraquer's methods, proposed the use of a disc of skin with the fat attached in order to obtain a better support for the stump and to make easier the suture of the recti. He either sutured the conjunctiva to the margins of the skin disc or made a purse string suture covering also the skin. His paper was published in *Anales de Oftalmologia*, July, 1901.

These results, however, remained practically unknown in Europe and in this country, notwithstanding they were being quoted in the German Ophthalmic Year Book, until Dr. Bartels, in 1908 advised the use of fat as a better implant after enucleation. (See O. Y. B., v. 6, p. 276.) The main objec-

tion to this method was the slow absorption of the fat and the shrinkage of the stumps, but time has shown that always enough fat remains to give the stump perfect motility and to avoid the sunken lids, which is the chief deformity after simple enucleation. M. U.-T.

**Ralston**, on the contrary, after using fat implantation for the past two years went back to the use of glass spheres, not because fat was unsatisfactory, but because the sphere met every requirement of surgery, with the further advantage of not being subject to shrinkage. The operation is, moreover, easily performed and does not require abdominal incision to procure the fat.

**Risley** has exhibited a man in whom he performed Mules' operation twenty years ago. He still has a perfectly healthy and freely movable stump; there is no thinning of the sclerotic and no tendency to escape of the glass ball. Risley advises for Mules' operation the previous suture of the four recti muscles to the conjunctiva. After the operation a conformer is introduced and a bandage applied.

**PROTHESIS.**—**Valois** asserts that when enucleation has been done, and the cavity is so irregular that a prosthesis can not be admitted; it is necessary, first, to remake by surgical interference a good socket, and second, to preserve and to enlarge it. He deals exhaustively with the second point and recommends the use of the special ebonite olives he has devised, (see O. Y. B., v. 13, page 276), with some later changes, specially made to keep them in the desired place during all the cicatricial stage. For this purpose the olive is fixed in one end of a steel rod to the other extremity of which a disc of ebonite is appended, and the latter properly secured with the dressing over the lids. When the cicatrization is thoroly complete, if the cavity is small he advises gradual dilatation with olives of increasing size. To facilitate draining the olives are now made fenestrated, and to obtain a softer contact the edges are finished in soft rubber.

**Terrien** asserts that the better stumps for prosthesis are the natural ones; regular, nonpainful atrophic

globes, the posterior segment of the eye and the retracted scleral membranes after evisceration. Unfortunately amputation of the anterior segment of the eye and evisceration are not entirely safe in regard to sympathetic ophthalmia, even after optico-ciliary-neurotomy.

The ideal method is the grafting of cartilage after enucleation, attaching the four recti muscles to the implant. The motility of the stump is perfect, the sunken lid is avoided and the danger of sympathetic ophthalmia eliminated. When grafting is not done the artificial eye must be provided with a rubber shell; or even, if it is necessary with a mould of soft wax, placed behind the shell and worn temporarily.

**Dimitry** suggests to make in the posterior surface of Snellen artificial eyes an opening from four to twelve mm. in size, with smooth edges; in order to produce a moderate suction thru the vacuum brought about by the movements of the lids. The use of a rubber cap upon the artificial eye, with a small opening in the center may give the same results, he asserts.

**RESTORATION OF SHRUNKEN SOCKETS.**—**Ralston** advises the implantation of a small glass sphere in shrunken sockets of old enucleations. He performs a vertical incision on the conjunctiva at two-thirds the distance from the outer canthus to the center, avoiding the latter, which is generally drawn back to the optic nerve and depressed. The incision is undermined in all directions from the external canthus to a point well beyond the center. Then the deeper structures are incised vertically as near to the outer canthus as possible, the conjunctiva being drawn well back with a strabismus hook. With a sharp knife a slowly executed stab with excursions above and somewhat below is made to encircle two-thirds of the orbit. In this way a fairly large sac is made into which the sphere is placed. This cavity must be made a little above the center of the nasal side. Sutures are made in such a manner that the two incisions do not fall one over the other, the deeper one being well covered by smooth conjunctiva. The sphere needs to be small.



## THE LACRIMAL APPARATUS.

JOHN A. McCaw, M. D., OPH. D.

DENVER, COLORADO.

This section reviews the literature from January, 1917, to July, 1918. Some related matter will be found in the section of Injuries.

**EXTIRPATION OF THE LACRIMAL GLANDS.**—The abundant and continuous epiphora following removal of the lacrimal drainage channels depends, **Calderaro** thinks, in a majority of cases upon hypersecretion of the lacrimal glands. This disturbance ceases with removal of the orbital lacrimal gland and more surely with the removal of the palpebral portion.

After the removal of the orbital gland there is a period from 2 to 6 days during which the conjunctiva is either not at all or scantily lubricated; subsequently this condition improves and the moistening becomes sufficient to keep the conjunctiva normal. Following the removal of the palpebral gland there is abrupt disappearance of the lacrimal secretion. When the conjunctiva is normal its condition of lubrication improves little by little until it is restored to physiologic limits, here being established a vicarious hypersecretion of the subconjunctival glands.

In old chronic trachoma there are always changes in the subconjunctival lacrimal glands; which may in large part atrophy and disappear, in which case removal of the orbital or the palpebral gland may expose the eye to unhappy results from xerosis and conjunctival atrophy.

**Petit** for the extirpation of the palpebral portion of a gland everts the upper lid, and with a curved needle passes the thread thru the tarsal conjunctiva about the posterior margin of the tarsus close to the external canthus. This thread is made into a loop by which the position of the parts is easily controlled by the left hand, which can still be used to hold the forceps for the ablation of the gland.

**LACRIMAL DRAINAGE.**—After careful and exhaustive study of the mechanism of the drainage of tears with special reference to the results of modern tear sac operations, **Friberg** is of the opinion that there is some hindrance to the regurgitation of tears especially at the sac end of the canaliculi. There seems to be no absolute evidence that there is any sphincter action around the puncta. The theories that explain the exit of tears can be classified in two groups. The flow is dependent upon the movement of the lids or it is not. In the latter group there are three theories: Tears flow into the nose by siphon action, by capillary attraction, or by aspiration from the nose. None of these mechanisms account for the known facts.

The movement of the lids can act by compressing or dilating the sac or by squeezing the canaliculi. After **West's** and **Toti's** operations the tears pass normally into the sac, so we are bound to conclude that even if we admit some alteration in the shape of the sac, the canaliculi alone are able to drive the tears into the nose. There is no proof that blinking either dilates or compresses the sac. The canaliculi, normally are held open by the elastic fibers that surround them, and by the tonus of the surrounding muscular fibers. During lid closure they are compressed against the caruncle and the fluid they contain is forced into the nose.

The author, after a **West** operation, succeeded in proving that fluid is expressed during lid closure. He made a funnel of rubber which he attached to a U tube. The funnel was pressed against the nasal opening made in the operation, and then each time the lid



closed the fluid rose in the U tube till it stood several millimeters above the level of the eye.

**ABSCESS OF CANALICULUS.**—**Tooker** reported an interesting case of localized suppuration of a canaliculus. A man aged 88, complained of a painful swelling in the upper lid of the right eye at the angle of the nose. Examination revealed the presence of chronic trachoma in the lids of both eyes; and in the upper lid of the right eye an abscess of the canaliculus, with drainage neither into the lacrimal sac nor the conjunctival sac. The swelling was about the size of a bean, and on being opened a cheesy purulent liquid escaped. He thinks that the canaliculus became occluded at both narrowed orifices, externally and internally, following an extension of the trachomatous processes from the conjunctiva. The occluded passage then probably became infected and an abscess resulted.

**LACRIMAL STENOSIS IN INFANTS.**—**Roy** in his article on lacrimal stenosis in infants and its treatment, defines this condition, as those cases which present excessive tearing in the conjunctival sac, or flowing out upon the cheek, and some catarrh of the palpebral conjunctiva. He gives the following groups:

(1) Stenosis due to congenital malformations, as absence of the puncta, or closed with a membrane.

(2) Stenosis due to spasmodic contraction in some portion of the passages.

(3) Stenosis the result of a catarrhal thickening of the mucous membrane at some point in the lacrimal passages.

Treatment can be summed up as follows: Expression of the contents of the sac, mild antiseptic in the eye, treatment of nasal conditions, occasionally probing and washing out the tear passages. Most of these cases get well without any treatment. Roy asked Knapp, Gruening, Cheatham, Burnett, Alt, de Schweinitz and Theobald if they had ever seen a case of spasmodic stenosis; all replied in the negative.

**Green** thinks that infantile dacryocystitis, in the majority of cases, is the result of blockage of the lower end of

the nasal duct by fetal remains, and considers the rational treatment is to probe the canal, after expression and lavage have failed. He also thought a flexible probe might be an advantage.

**Curdy** thought that since the pneumococcus is the microorganism infecting the closed passage, there is danger to the cornea in waiting too long, before resorting to the probe.

**INFECTION OF THE LACRIMAL CANAL.**—Such infection in war ophthalmology is the subject of a paper by **Grelault**. Infection of the lacrimal canal, he thinks constitutes a danger to the vitality of the eye in wounds of the latter. Infection may be said to exist whenever the drainage of the lacrimal duct is imperfect. The signs of imperfect drainage are:

(1) When by pressure of the sac there is an exudate of mucus, or a muco-purulent or purulent fluid from the puncta.

(2) The presence of a swelling, a liquid tumor on the inner side and below the internal commissure. This dilation shows that the walls have lost their elasticity and that the sac is incapable of emptying itself.

(3) Investigation of the patency of the lacrimal canals by an injection made thru one of the lacrimal points.

(4) Investigation of the physiologic capillary permeability. This should be done by the aid of a weak collyrium of argyrol or methylene blue. The patient blows his nose to clear the middle meatus of mucus. Each nostril is occluded with a plug of cotton. The subject's head is slightly inclined forward to prevent the passage of the fluid into the rear cavities. In presence of normal permeability the colored liquid stains the upper surface of the cotton.

In a subject who presents none of these signs, the lacrimal canals may safely be regarded as healthy.

**Therapeutic Conclusions:** (1) Radical cure by extirpation or igneous destruction except when men are at the front, this constitutes prophylaxis in view of subsequent wound of the eye.

(*To be continued*)

# DIGEST OF THE LITERATURE.

## THE LACRIMAL APPARATUS.

JOHN A. McCaw, M. D., OPH. D.

DENVER, COLORADO.

*(Continued from September issue)*

(2) In case of wounds of the globe or the cornea and in presence of infection in the lacrimal glands, a radical cure must be done by means of igneous sterilization. Should the case run on to panophthalmia or ulcer, radical cure of the sac is still indicated.

**Black** reported a case of double dacryocystitis of many years' duration in a man 49 years of age. The man had central leucomas in both eyes from infection following slight corneal injuries. After an unsuccessful iridectomy upon his right eye, the patient came to Black with this eye quite irritable. He enucleated the right eye, and performed a dacryocystorhinostomy on the left tear passages. In a short time drainage stopped, probably due to some injury to the upper end of the sac, then he destroyed the sac with trichloroacetic acid, to eliminate infection, when an iridectomy was done on the left eye.

**Von Szily** investigated the normal and pathologic conditions of the lacrimal passages by means of roentgenographs. Two principal types constantly recur. In the first group the changes start from the so-called isthmus ductus lacrimalis. Beneath the sac with a comparatively broad duct a contraction takes place which later becomes complete. In another large portion of cases there is a gradually progressive disease and contraction of the duct from below. In both cases large ectasias and diverticuli of the sac may appear as time goes on, of which the roentgenograph first gives us a correct conception. He showed also pictures of tuberculosis of the lacrimal passages, of valvular occlusion in which abundant residual contents always re-

main after the tensely filled sac has been emptied by pressure, of acromegaly, of congenital atresia of the nasal opening, and of battle wounds of the lacrimal passages.

**TREATMENT OF LACRIMONASAL OBSTRUCTION.**—**Gleason** considers the small size of the puncta and the pressure of the valve of Hasner protection against infection either from the eye or the nasal mucous membrane. The nasal orifice of the duct is in the suture of the inferior turbinate with the superior maxillary, at the junction of the anterior fourth with the posterior three-fourths of the turbinate at the apex of a broad inverted V, the line of suture descending somewhat abruptly in front and more nearly horizontal behind; so that the valve of Hasner is easily located by passing a probe from behind forward beneath the inferior turbinate until the end of the probe sinks into the apex of the V described above. The nasal orifice of the duct can be inspected in most instances by infracting the inferior turbinate with Sullivan's modification of Killian's speculum.

Generally the obstruction to the flow of tears is either where the inferior canaliculus enters the sac or at the nasal orifice of the duct. If the obstruction is at the canaliculus, the treatment is astringent collyria, dilation, or slitting open the canaliculus. When the obstruction is at the nasal orifice of the duct, treatment should be directed to reducing the size of the inferior turbinate, or changing its relation to the nasal wall by infracting it towards the septum.

**Dr. Posey**, in discussion, said that the cause of a watery eye is not always



intranasal, for it may depend upon a number of factors connected with the eye. Thus, increase of lacrimation is symptomatic of nearly all inflammatory conditions of the eye; certain conformations of the skull which occasion abnormally small lacrimonasal ducts predispose to it. Anything which interferes with the delicate suction like action by which the tears are sucked up from the globe, and conveyed into the lacrimonasal sac, is also a causal factor. Certain innervational disturbances in the supply of the orbicular muscle, and relaxation of the internal palpebral ligament will occasion this.

Posey's plan of procedure in the treatment of diseases of the excretory portion of the lacrimal apparatus is as follows: If there is simply increased lacrimation without any apparent local cause to occasion it, the punctum is dilated and the sac and duct washed out with a solution of boracic acid, zinc or alum. If repeated syringing fails he then introduces a style, care being taken that the length of the style conforms to the length of the duct. The style is removed at the end of three or four months.

For acute dacryocystitis after administration of a general anesthetic, the lower canaliculus is emptied by pressure on the swollen lid and a style inserted. For lacrimal stricture with catarrhal discharge: Syringing with astringent washes and instillation of a 1 or 2 per cent solution of ethylhydrocuprein into the conjunctival sac several times daily. Failure after two or three weeks of this treatment is followed by extirpation of the sac. For mucocoele of the sac, extirpation is advised in all cases. For extirpation of the sac the method of Meller is followed closely.

Holloway has had good results in using mercuraphen as an irrigating fluid.

Nagano reports prompt cessation of discharge after use of pyoktanin in dacryocystitis, and **Figueras Pares** reports his method of treating chronic dacryocystitis without resort to extirpation of the lacrimal sac.

**THREAD DRAINAGE FOR CHRONIC DACRYOCYSTITIS.**—**Pond** uses a long silver probe with one end blunt, and the other, having an eyelet large enough to carry a large silk suture, is threaded and passed thru the canal into the nose, where the end is grasped by a pair of forceps and drawn out thru the nostril. The probe is then unthreaded and the silk left in this position with the ends tied together. The silk is worn about a week, being drawn thru the nose 2 or 3 times a day. The canaliculus is slit and the operation is done usually under local anesthesia but occasionally he uses ether. He washes the canal daily with 10 per cent iodine. The string is protected by a piece of gauze and adhesive plaster.

**WINDOW RESECTION.**—**Chamberlin** modifies the West operation, as described by himself. A probe is inserted into the canaliculus, sac and duct. This probe is held in place by an assistant. When the duct is freely uncovered the point of the probe is directed inward towards the septum, thus bulging in its septal wall. A thin scalpel is now inserted between the probe and the lateral nasal wall, and the incision carried well up beyond the isthmus, so that the probe ultimately passes horizontally into the nose.

Mosher, in discussion, reported four cases that he had operated on. Three of them were of two years' duration. One case was of mucocoele of the sac. After nine months there was no return or swelling of the sac and the opening into the nose is patent. The second was one of long standing, a suppurative sac, with a skin fistula. The eye is all right and the tears run over only when the patient gets cold. A third patient had a suppurative sac for seventeen years complicated with an infected mucocoele of the ethmoid labyrinth. There is now a patent opening into the nose and the tears run over only on a cold day, or in a strong wind. The fourth patient had a bony occlusion of the nasal duct. This man is wearing a style at the end of ten months, and with it there is no running over of tears except in a strong wind.



**Good** reported a case of double dacryocystitis. On one side he performed the Yankauer operation with success. He preferred the Yankauer operation to the West, since Yankauer pointed out that frequently it is the bony wall around the duct down below that makes pressure upon it. And if this bony wall is removed, the natural opening is reestablished.

**DACRYOCYSTORHINOSTOMY.**—**Kyle** referred to an article published by him in the *AMERICAN JOURNAL OF OPHTHALMOLOGY*, 1897, in which he described practically Toti's operation. **Hirschberg**, of Berlin, in commenting on Kyle's operation in his book on diseases of the eye, said that the operation as described by Kyle was known for more than 1,300 years, and was a rediscovery.

In his modification of Toti's operation, **Wiener** uses local anesthesia. If the sac is found closely adherent, it is better to make an incision into the sac from above downwards, just where the anterior wall is reflected on to the bone. With curette or dissection he cleans off this layer of mucoperiosteum from the lacrimal fossa and gets a clean picture of the bone cavity. A trephine of 4 mm. in diameter is placed as low down in the lacrimal fossa as possible, and a button of bone removed. The opening in the bone is enlarged to 6 mm. by 10 mm. by a small conchotome.

If possible a flap of the nasal mucous membrane, quadrilateral in shape, is cut base down, and reflected back into the sac and the packing adjusted. He uses selvage-edged iodoform gauze

half inch, saturated in vaseline, for the packing. The upper suture is long enough to permit the withdrawal of the pack for renewal. The anterior cut edge of the sac is stitched with chromic gut to the periosteum of the anterior edge of the opening and the skin wound is closed.

**EXCISION OF LACRIMAL SAC.**—**Kirkpatrick** reports 214 cases of excision of the sac for the year 1916, at the government ophthalmic hospital in Madras. He simplifies the operation by disregarding the preservation of the palpebral ligament. This, it has been found, produces no disfigurement.

**Stapleton** reported six cases of chronic dacryocystitis. He extirpated the sac by the Meller method from all of them with uniform results. **Garcia del Mazo** treats dacryocystitis with extirpation of the sac. **Thompson** cocaineizes the canal and passes a small flexible curette and currettes all parts of the canal, and removes the granulations. Next he performs a dacryocystorhinostomy and with twisted gauze rubs the sac and the lacrimal duct.

**MISCELLANEOUS CONDITIONS.**—**Crisp** reported a case of *abscess of the caruncle* in a woman 21 years of age. The abscess was preceded by an attack of conjunctivitis. The process was repeated in the other eye four months after the first attack. **Fava** reports rare affections of the lacrimal apparatus.

**Utsida** described a skin *papilloma* appearing from the mouth of an open tear sac wound. He believed that it was due to the secretory irritation of the skin that was rolled in, similar to the formation of a condyloma.

## DISEASES OF THE LIDS.

FLORENCE MAYO SCHNEIDEMAN, M. D.

PHILADELPHIA.

This section reviews the literature from January, 1917, to July, 1918. Related topics are considered in the sections on Conjunctiva, Orbit, Tumors, and Injuries.

**ANOMALIES.**—**Posey** reports a case of bilateral *coloboma* of the lower lids. The notch in the right eyelid was situated at the junction of the middle and

outer thirds, that in the left at the junction of the middle and inner thirds. Both superior maxillary bones showed faulty development, in consequence of

which the right side of the mouth was drawn markedly upward. The inner halves of both upper lids exhibited colobomatous tendencies, the margins in this position being drawn upward in a sweeping curve with its convexity downward. The fissure in the right lid had been corrected by a plastic operation as also the deformity at the angle of the mouth; the latter operation by Dr. John B. Roberts. The coloboma in the left lid, which was complicated by symblepharon and marked retraction of the tissues of that region, had resisted correction at the first operation. Dr. Posey said he had another procedure in mind which aimed at correction of the deformity by transplantation of a flap of skin from the root of the nose into the colobomatous area.

**Van der Hoeve** reports three cases of congenital *ankyloblepharon* in which, beneath the adherent margin of the lids, the plica semilunaris was normal, but the caruncle much enlarged and firmly attached to the inner surface of the lids. The lower lacrimal puncta had an anomalous position. They were so far from the normal one, that they did not dip into the lacrimal lake, but lay in front of the cornea.

**ANOMALOUS ASSOCIATED MOVEMENTS.**—In the case reported by **Demaria** and **Caldora** in which, during rest, a slight ptosis existed of the right eye, this anomaly disappeared and even left exposed a part of the sclera above the cornea, when the inferior maxilla was drawn downward in mastication. The elevation of the upper lid attained its maximum when the jaw was moved laterally in the direction opposite that of the affected eye. The other ocular muscles were normal tho the pupil was larger than that of the other eye. The most general opinion of the cause of this condition is that the nucleus of the oculomotor is congenitally related to the trigeminus and even the facial. **Lutz**, however, opposes this view and thinks that the anomaly must be referred to the subcortical center. On the ground of the anisocoria observed in their case, the reporters believe that the cause must reside in the cortical centers, near the lower part of

the frontal convolutions, which are probably connected by Meynert's U fibers.

In **Holloway's** case of a woman aged 44, there was a history of distinct drooping and retraction of the right lid at times, or as the patient expressed it, "she winked when she ate." This was first noted by her mother when she was a nursing infant. While the palpebral fissure measured  $9\frac{1}{2}$  mm., she stated that at times the right upper lid drooped. The eyes fixed well in various positions, except above the horizontal plane, when the right eye diverged. There was a suggestion of lagging in the upward rotation of the right eye. Upon looking downward the right upper lid failed to follow the globe to the same extent as the left upper lid. Upon attempts at chewing, there was retraction upward of the left upper lid, accentuated upon labial movements of the jaw. This retraction was excessively marked when the patient looked down; and but slight when she looked upward. The diplopia fields indicated paresis of the right superior rectus. The eyes were otherwise normal.

In **Kleinhaus's** case with complete congenital ptosis of the right lid, upon opening the mouth the lid shot up. Lateral movements of the jaw had no effect upon the lid. There was insufficiency of the right superior and internal recti, no fundus changes, and vision in each eye was normal.

**Menacho** observed retraction of the upper lid associated with lowering of the lower jaw, but not with its lateral movements, as in most of the cases published, in a healthy young woman presenting simply a slight enlargement of the thyroid, without any of the other symptoms of Graves' disease; the association was first noticed when the patient was 12 years of age. How may we explain the connection between the third and fifth nerves, in this case, acquired and not congenital? The writer believes an exclusively anatomic explanation of this phenomenon to be unjustified. He argues that a close relationship exists between the functions of the cranial nerves—a relation which



may be attributed to connections situated at the nuclei of origin, between the subcortical centers, or in the cortex itself. These paths of communication, regarding whose precise course physiology and anatomy have still something to clear up, may be functionally interfered with, either by inhibition or irritation; this hypothesis explains provisionally the phenomena presented by this case. A purely anatomic hypothesis would be quite justifiable if the condition had been congenital but meets with an insuperable objection where it is acquired.

In **Schirmer's** case a healthy man aged 28 years developed a left sided facial paralysis seven months ago; after four months, slow but continuous improvement began. Today recovery is perfect except for a slight weakness of all the muscles innervated by the seventh nerve. For more than three months, every movement of the left cheek, in laughing and chewing, is accompanied by partial closure of the left eyelids. Spontaneous contractions of the left orbicularis are not present. The reporter thinks that these associated movements are due to the fact; that from the central stump of the facial nerve, fibers which were meant for the muscles of the cheek have grown into the orbicularis muscle. Every intended movement of the cheek will therefore be accompanied by contraction of the lid muscle. This explanation was first given by Lipschitz.

**Gonne** observed a case which he considers to be an instance which has hitherto been described in the Italian literature alone under the title "*Ptosi Bilancia*"—Balance Ptosis. The patient was an adult male the subject of lues, who developed ptosis of the left eye, and the left eyeball showed a slight divergent strabismus. The inward rotation of this eyeball was impaired, but other extraocular movements of both eyes were normal. The right pupil reacted promptly to light, the left sluggishly. *When he closed the right eye, the left upper lid raised without effort, and the eye was opened to almost the full extent.* With the right eye opened the left could not be raised at all. There

was no facial palsy or asymmetry, and the tongue was protruded straight and showed no atrophy.

There were a number of other neurologic symptoms of syphilis of the nervous system, a positive Wassermann reaction in the spinal fluid. Well marked disseminated choroiditis, probably specific, was also present. The case evidently showed incomplete paralysis of the left third cranial nerve, manifesting itself as balance ptosis. It is quite similar to the case of "*Ptosi Bilancia*" reported by Artum in *Il Policlinico Practica*, 1913, in which the diagnosis of syphilitic basilar meningitis was made. The same symptom was reported by Pacetti in three cases of tabes and taboparesis. In none of these cases was the spinal fluid examined.

This peculiar type of ptosis may be looked upon as a sign of syphilis of the central nervous system. It might be thought to be due to the reflex action on the part of the patient to prevent diplopia, but one objection to this view is that in a reflex closure of the eye, there is spasm of the orbicularis palpebrarum, which is not supplied by the third nerve, but by the facial. There was no indication of facial spasm in this case. Another objection is that although diplopia is common, a balance ptosis is extremely rare.

In the discussion of this paper, Clay advanced the plausible explanation, that the paretic left lid could be raised when the right eye was closed by reason of an increase of nerve supply to the partially paralyzed levator. This was the original explanation also of Pacetti, tho this hypothesis involves a theory of the relations of the oculomotor nuclei which is not altogether clear, as observed by Camp in the course of the same discussion.

**PTOSIS.**—**Posey** observed in an infant congenital ptosis and lack of upward rotation of the eyes, with marked dilatation of the veins in the skin of the upper lids. There were no vascular changes elsewhere about the eyes and nothing in the history which gave a clue to the origin of the venous swelling.



In **Spencer's** case of a man aged 27, there was a history of ptosis since 15 or 16 years of age; but which has been much worse for the past three years. The mother, maternal grandmother, two maternal aunts, and one brother all had a similar condition. There was compound myopic astigmatism in both eyes, correction of which gave satisfactory vision. The anterior segments and fundi are negative. The subject usually fixes with the right eye, the left eye is often divergent 10 or 15 degrees, which divergence was found to be alternating. Abduction, adduction, super- and subversion are all very limited, as is also convergence. Neither eyelid can be raised without the assistance of the frontalis muscle. The reporter believes this to be a case of bilateral congenital absence of the superior rectus and levator of the upper lid. He performed a Tansley-Hunt operation upon each upper lid with slight over correction.

A new operation for ptosis has been proposed by **Maddox**. Like Bowman's operation it approaches the tissues by double eversion of the lid with an especial forceps. It is particularly suited to cases of acquired ptosis, and may be supplemented by anterior operations. It has been described in detail, *A. J. O.*, v. 1, p. 52.

**MARGINAL BLEPHARITIS.** **Cuénod** divides this disease into the simple and ulcerated forms. The former is due to chronic hyperemia of the lid margin, frequently of diathetic origin. It often occurs in subjects exposed to frequent irritation of the conjunctiva, or from ametropia, obstruction of lacrimal passages or vitiated atmosphere. There is hypersecretion from the Meibomian glands and the glands of Moll. The ulcerated form is due to a folliculitis from staphylococci.

The treatment consists of: (1) Combating the atony of the tissues; (2) Preventing general autointoxication, usually from the alimentary canal; (3) removal of all local causes of irritation; (4) Efforts to secure vasoconstriction of the vessels; (5) combating the staphylococcic infection. As a vasoconstrictor, the author

advises adrenalin, followed by cold compresses. When the staphylococci have penetrated deeply into the follicles, applications of yellow oxide fail to reach them. In this condition, the writer epilates the entire ciliary margin under cocaine, and then applies a solution of iodid in acetone, followed by a glycerin dressing for 24 hours. In case of recurrences he advises anti-staphylococcic vaccine.

**Unna** calls attention to the stubbornness of ciliary blepharitis under the treatment usually employed, namely, Pagenstecher's ointment. He claims to have been always successful with the following method. He combines two processes for two different ends; one, a simple treatment of the palpebral inflammation and of the neighboring conjunctiva, and the other an active measure which penetrates into the depths of each hair follicle. The first treatment, an ointment, is uninterruptedly applied by the patient, the second from time to time, by the physician. The following ointment: Pyraloxin 0.1 to 5 gr., Borax water (3%) 10 gr., Solution of suprarenin 1 gr., Eucerin anhydr. ad 50 gr. is to be applied several times daily by the patient. It has rendered great service, not only in all eczemata of the lids, but also for reducing inflammatory conditions of the lid margin and conjunctiva. Under its influence the scales are easily detached, and then it suffices that the physician touches, every other day, the follicular canals, which are uncovered, with a small tampon moistened with silver nitrat 5 gr., water 10 gr., and sp. ether nitrous 85 gr. This alcoholized fluid penetrates sufficiently deep into the follicle; and the silver nitrat is not reduced in this weaker solution as it is in the common alcoholic solutions.

**ECZEMA.**—In a witty article, with pithy references from Don Quixote, Shakespeare, Rabelais, Guy de Maupassant, and an epilogue to John the Baptist, with an excursion into the ancient doctrine of the four humors, **Montgomery** discourses very pleasantly upon the subject of seborrhea and the effect of that condition in opening the breach to the attack of bacteria;

with especial reference to other mal-  
eficent influence upon the edges of the  
eyelids (*Blepharitis marginalis*), giv-  
ing to the complexion that Swiss  
cheese effect combined with chamois  
leather. The article is really an in-  
structive one and loses nothing from  
its pleasantry.

The same writer reviews the more  
usual remedies for eczema of the eye-  
lids. For *blepharitis marginalis* he  
discusses the ointments of both the yel-  
low and the red oxides of mercury, and  
the probable mode of action of these  
oxides—namely: the oxygen being  
very loosely held (*Priestley* in fact ob-  
tained the oxygen which he discovered  
in 1774 from  $\text{Hg.O.}$ ) is displaced by  
the chlorin of the sodium chlorid of  
the warm alkaline tissue juices and  
tears, forming nascent  $\text{Hg.Cl}_2$ ; which  
in turn unites with the albumin pres-  
ent and is swept away. This nascent  
bichlorid of mercury therefore forms  
an effective and, to the tissues, innocu-  
ous antiseptic. Calomel ointment 2%  
sometimes agrees better. Some of the  
metal changes into the bichlorid of  
mercury as in the former instance.  
Camphor acts soothingly and also as  
an antiseptic and 1 or 2% may be  
added advantageously to the above  
ointments.

In cases where the integument has  
an intolerance for grease, watery solu-  
tions of the cyanid or bichlorid of  
mercury (1-10000) may be advised.  
Nitrat of silver in 1 or 2% solution is  
often excellent were it not for the dis-  
coloring effect. Argyrol is less active.  
Far better than the above solutions is  
warm or hot solution of boric acid per-  
sistently applied for some time. In  
erythematous eczema great care must  
be employed in the application of any  
remedy. Some indeed assert that this  
affection will tolerate nothing but cold  
cream; but something more than this  
may be done to mitigate the asperities  
of the disease. The dephlogisticating  
effect of hot water applications may be  
also employed with excellent results.  
Something should also be added to the  
water to heighten its specific gravity  
and to render it hypertonic, as other-  
wise it would act osmotically and det-

rimentially on the congested papillary  
layer of the skin. Although it is often  
said that lead water should not be em-  
ployed in this region, the writer can  
find no clinical or scientific reason for  
this belief, but it should be very dilute.

Ointments may act badly for two  
reasons. Some skins are intolerant of  
grease, and in very active hot eczemas  
the grease may act heatingly by inter-  
fering with escape of secretions and  
radiation of heat. Pastes which are  
ointments but contain far more pow-  
der, are sometimes superior. The paste  
made of naftalan is deserving of spe-  
cial mention. Being obtained from a  
coal tar mined in southern Russia, it  
has like many other articles become  
practically unattainable since the war.  
It is of special value in acute eczema,  
as in infantile eczema. The acute der-  
matitis of the eyelid, so frequently ob-  
served in poison oak (*primula*) poison-  
ing, and in hair dyes (*paraphenalin di-*  
*amin*) receive the same local treatment  
as erythematous eczema.

**GANGRENE OF THE LIDS.**—Three cases  
reported by **Soliman** were characterized  
by rapid swelling of the lids and face,  
fever, and general disturbance; suc-  
ceeded by extensive sloughing of the  
skin, which extended to the brow, tem-  
ple, cheek, and side of the nose, and  
left severe cicatricial changes. In one  
of these cases bacteriologic examina-  
tion showed, in addition to staphylo-  
cocci, a short bacillus, which grew lux-  
uriantly in agar. Emulsions of this ba-  
cillus produced gangrene in the skin  
of the abdomen of guinea pigs, and in  
the eyelids of a horse.

**HERPES.**—In **Wilson's** case, following  
neuralgic pains over the right side of  
the forehead and extending down over  
the mastoid, a crop of vesicles appeared  
over the right brow, forehead and  
scalp, and margin of the upper lid.  
The upper and lower lids were so  
swollen that the cornea could not be  
inspected. There was great prostra-  
tion with fever, so that the disease pre-  
sented the appearance of an alarming  
infection. Crops of pin point vesicles  
also appeared upon the abdomen and  
back. The acute condition lasted about  
one week followed by a comparatively



rapid convalescence. The cornea was not involved.

**Wible** observed *herpes zoster ophthalmicus* in a man aged 51 years. The patient had been treated by his physician for 16 days for supposed erysipelas. The vesicles were on the right side; extending from 2 inches within the midfrontal hair line to the tip of the nose, and of a width of space varying from 1 to 2 inches. The cornea and conjunctiva were involved, causing profuse lachrimation and intense photophobia. Severe burning and itching pain where the skin was involved was complained of. The nerve supply to the infected region included the frontal, lacrimal and nasal branches of the ophthalmic division of the fifth nerve.

The treatment consisted of quinin and acetanilid, the latter to alleviate pain. Carbolic acid ointment was applied locally to the skin, cold compresses to the eye, and atropin instillations. This treatment gave reasonable comfort. Thirty days after the attack, the herpes had almost healed, leaving deep pits resembling those of smallpox. The pupil, at first irregularly dilated, has become circular. The cornea presents a number of small opacities. The conjunctiva, both ocular and palpebral, is still angry and swollen. This is the fourth case seen by the reporter in about 20,000 private and hospital cases.

**Morax** reports two cases of herpes consecutive to *antityphoid inoculation*. In the first case, a slight eruption of herpes on the lower lid followed a second injection, accompanied by slight fever. A third injection, one week later, was followed by rigors and marked increase of temperature. A few days later herpes appeared on the lips and nostril and behind the right ear. Five days subsequently the right eye showed a typical attack of herpetic keratitis. The author also refers to the following three cases of ocular lesions following antityphoid inoculation, but he regards these as coincidences: (1) Paramacular retinal hemorrhage; (2) paralysis of both external recti, associated with generalized paralysis; (3) optic neuritis due to in-

tracranial neoplasm. These four cases were the only instances of ocular lesion observed among 1,700 inoculated soldiers whom he examined. The writer records another case of herpes following a fourth antityphoid inoculation. The eruption had occurred upon the face, eyelids, and cornea.

**Gloagen** observed three cases of palpebro-ocular herpes following *antityphoid vaccination*. In the first case, the first two injections presented nothing of special note; the third was followed by fever, headache and pain in the back, on account of which latter symptom lumbar puncture was performed. The same day (i. e. the day following the injection) an outbreak of naso-labial herpes, especially intense upon the right side, occurred. Three days later the right eye became congested with photophobia; but the patient was not referred to the ophthalmic clinic until three days after this. At that time the reporter noted typical herpetic keratitis, the delicate ramifications of which could be seen by means of fluorescein. Recovery took place at the end of 18 days; leaving, however, a fine corneal opacity which lowered the visual acuity to 0.6.

In the second case, three injections were made without reaction; the fourth was followed by fever and headache. The following morning an extensive naso-labial outbreak of herpes appeared, especially upon the right side; four days later the reporter observed in addition to the palpebral eruption, a typical herpetic keratitis involving almost the entire cornea. Recovery took place at the end of 25 days, with persistence of a slight opacity which reduced the visual acuity to 0.2.

In the third case the same constitutional symptoms followed a first injection. The same night an eruption of naso-labial herpes took place and the next morning there was photophobia of the left eye. Upon admission to the hospital three days later, the reporter observed patches of herpes disseminated upon both lids of the left eye. The cornea was completely covered. Recovery was slow, requiring 43 days. Vision reduced to 0.1. Thus ophthal-



mic herpes was observed following the first injection in the third case, the third injection in the first, and the fourth injection in the second.

**SYPHILIS.**—In **Pisarello's** case of hereditary lues, in a man of 22 both lids of the right eye were greatly swollen; and a large and deep ulcer occupied the region of the internal angle and the inner third of the upper, and two-thirds of the lower lid. The edges were sharply cut, raised, and the base covered by a grayish membrane which was readily removable. The eye was unaffected and vision normal. The submaxillary, preauricular, and cervical glands were painlessly enlarged. Microscopic examinations from the scrapings of the ulcer showed neither tubercle bacilli nor spirochetes. Intradermal tubercle reaction negative. Wassermann strongly positive. Intensive treatment with mercury and iodid resulted in a cure.

**Kitamura** observed in a 17 year old Chinaman a syphilitic process, which began at the tip of the nose and spread over the entire left half of the face, destroying both lids and the eyeball.

**TUBERCULOSIS.**—In **Hughes's** case a small growth had been removed from beneath the upper lid which was found to be a tuberculoma. Upon eversion of the lid, there were a number of soft dark red papules, that gave the typical "apple jelly" nodular appearance first described by Jonathan Hutchinson. At the center of the lid was a furrow where the old tuberculoma had been

removed. There was swelling and hyperemia of the conjunctiva and some drooping of the lid. A corneal ulcer was present with considerable bulging of the cornea. There were a number of enlarged broken down glands of the neck, and a discharging sinus of the ear. A family history of tuberculosis was elicited; repeated Wassermann tests were negative.

**Chance** writes a paper upon *Lupus Vulgaris*. When lupus of the face has lasted for a long time, it may invade the eyelids and the globe, with disastrous effects, even to blindness. But more commonly when the disease encroaches upon the eye, the cicatricial formations may only distort the eyelid, and cause moderate or even severe ectropion. The infection may pass from the nose thru the lacrimal passages to the conjunctiva, or in the reverse direction. The process may pass from the lids to their conjunctival surfaces; and extend even to the eyeball itself, which may become seriously affected. Tuberculosis and lupus of the conjunctiva should, according to Fuchs, be regarded as essentially identical affections.

Lupus ulcers of the conjunctiva can be distinguished from tuberculous ulcers by the fact that they have migrated from the skin; and that like lupus of the skin, they cicatrize spontaneously on one side, while on the other, the ulcer keeps advancing. When the disease invades the mucous membrane of the eye, treatment consists in the rad-

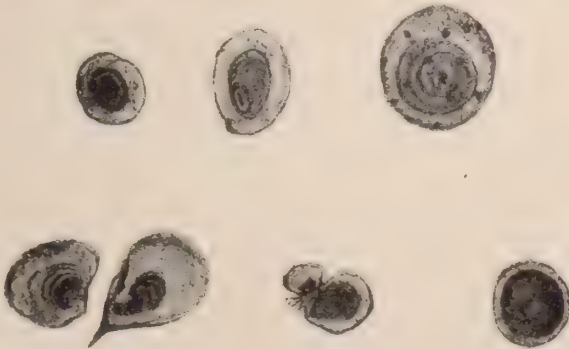


Fig. 1. Diagrammatic representation of the organism found by Del Monte. Each contains a nuclear stained portion in the center, surrounded by unstained substance with scattered granules. In the lower row are shown dividing forms and one that seems cystic. See page 170.

ical excision or curettement of the ulcers; and the cauterization of the raw surface, great care being taken not to damage the cornea. When the area is so extensive that complete removal is likely to be followed by symblepharon, or other deformity, reliance may have to be placed solely upon tuberculin. The after treatment consists in the long continued use of powdered iodoform.

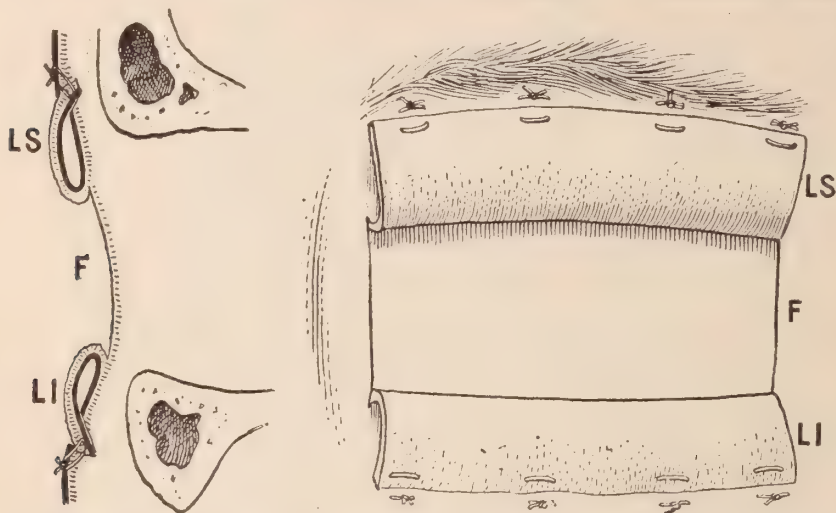


Fig. 2. Morax operation for total symblepharon. See page 171. Skin flap dissected up, and free from edge attached to skin at upper and lower margins of socket. Left in vertical section. Right as viewed from the front. L S upper flap. L I lower flap, F raw surface.

**CHALAZION.**—**Del Monte** claims to have discovered a protozoon which he considers to be the cause of chalazion. He bases his conclusions upon the following data: 1, Constancy of the parasite in all recent cases, or such as are still in process of evolution. 2, Characteristic form and structure, for exemplification see diagrams, Fig. 1, p. 169. 3, Localization at the points where the morbid process is still active; absence where the latter is completed or has never existed. 4, Evident irritating effect upon the tissue, constant presence of giant cells about the bodies in question. 5, Presence at the center of infiltration granules, in accordance with the general law that the cause of a granuloma is always localized at the center of the granulation. 6, Behavior analogous to that of other known pro-

tozoa, where the granulomata are seen to be rich in giant cells in which the parasites are almost invariably enclosed. The author summarizes the process which terminates in the formation of a chalazion as follows: Hydration, edema and decomposition of a definite extent of tissue, (meibomian epithelium in the primary or initial stage, tarsal in the secondary or stage of diffusion). Proliferative reaction and

formation of a granulomatous nodule, the center of which is made up of the remains of decomposed tissue. As concerns the mode of action of the parasite a primary lesion is produced; i. e. a kind of microbiosis or toxic histolysis, which is followed by proliferative inflammatory reaction.

To control pain and subsequent hemorrhages in the removal of chalazion **Bernstein** makes use of the Freer method of anesthesia and blood control employed in nasal surgery. A cotton tipped probe is dipped into the stock solution of epinephrin, and a few flakes of pure cocaine picked up. This is rubbed into the conjunctiva over the mass, and a short distance beyond. At the expiration of two minutes, the area is again rubbed with the same probe and solution. In another two minutes

anesthesia and blanching is complete. After making the cut into the conjunctiva, he makes use of Mcierhof's tympanum curet to remove the sac. This curet differs from the ordinary type in that its edges are serrated, and thoroughly remove the whole sac with the least damage.

**SYMBLEPHARON.** — **Morax** observes that whereas partial symblepharon can generally be managed readily, such is not the case in total symblepharon with complete abolition of the conjunctival sac. The formation of a new cavity for prothesis is a most difficult problem. The tendency to retraction and contraction of the orbital tissues is such that the most extensive and perfect graft suffers retraction, such that the new cavity decreases greatly and may even disappear almost entirely. To obviate this tendency, the author has devised a procedure which consists essentially in the formation of two wide "trap doors," the raw surfaces of which are turned outwards above and below by suturing their edges to the skin after freshening the latter. Wide epidermal grafts from the arm, thigh, or abdominal wall are then applied to the raw surfaces.

At the end of three weeks the "trap doors" are replaced and sutured together at their free margins after freshening. A shell of lead or enamel is placed and allowed to remain between the doors, the bottom of the cavity being now covered with the graft. At the expiration of from six weeks to three months, the palpebral margins are cut and prothesis is possible. Several illustrations show the conditions before and after operation. The accompanying diagrams assist in making clear the descriptions. The same procedure is applicable where the orbital cavity is still occupied by a globe or stump. See Fig. 2, p. 170.

In a case of symblepharon following the entrance of mortar into the eye, observed by **Wallace**, the formation involved the inner half of the lower cul-de-sac, graduated in width up and out; and extended to and involved four-fifths of the pupillary area. The growth is thought to be progressive,

involving more of the pupillary area at present than 3 or 4 years ago. [See also p. 43.]

**ELEPHANTIASIS.** — **Katana** observed, following a blow, a red swelling upon the upper lid which later involved the lower also. The skin was much thickened and felt elastic. Histologically, a thick tissue was found infiltrated into

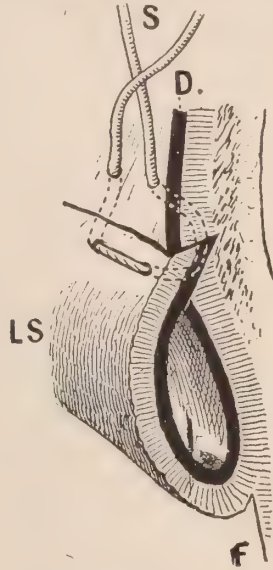


Fig. 3. Morax method of placing sutures to secure firm union of edge of flap. S suture; D epidermis; LS skin flap; F raw surface left at bottom of socket.

the blood vessels; in which tissue groups of lymph and plasma cells were noticed, especially around the blood vessels and enlarged lymph vessels; the latter were filled with lymph cells.

**TRICHIASIS.**—In a case of trichiasis of long duration, in trachoma, **Pattee**, in addition to the regular Hotz-Anagnostakis operation, split the lid margin and placed in the intermarginal groove, a skin graft from behind the ear. The result was quite satisfactory.

**ECTROPION.**—In **Schwenk's** case traumatic laceration of the brow was followed by cicatricial ectropion. The outer half of the upper lid and outer canthus were drawn up and out, exposing the outer half of the globe and tarsal conjunctiva. The first step in the operation consisted in freeing the mar-



gin of the lid from the brow. The flap should be about one-third larger than the exposed area to allow for shrinkage. The pediculated flap was taken directly from the outer canthus. The denuded portion, from which the flap was taken, was covered by undermining the skin and uniting the edges with sutures; this left a small triangle of new surface; which was filled up by a triangular flap from just below the outer canthus, and placed in the exposed triangle to prevent the canthus from being dragged out of its normal position. The last exposed patch was readily covered by two sutures. A bichlorid vaselin compress was applied as a dressing; this was not disturbed for three or four days to avoid disturbing the flaps.

The **Whites** describe the various forms and pathology of ectropion. They comment upon the unsatisfactory nature of the usual operations where the ectropion is marked, especially if due to trachoma. For advanced cases they have instituted and performed for many years with success the following operation: The eyelid is stretched and if possible the junction of the ocular and palpebral conjunctiva is found; and an incision, the entire length of the lid is made, that is from the inner to the outer canthus. This incision is carried thru the conjunctiva and the tarsus. It is always necessary to include the cicatricial line in the incision. This boatlike shaped piece of cartilage and conjunctiva is removed, leaving a deep space. Three double needle sutures are introduced into the ocular conjunctiva flap or end; and also into the strip of cartilage, if it is left at the discretion of the operator, equally distant from each other. The flat strip of cartilage is then pulled down into the above space, and the sutures are continued at the bottom of this space thru the tissues and tied on the cheek. This inverts the lid and the ectropion is corrected. The palpebral end of the conjunctiva granulates in the new trough of the lid. It can be sutured, if necessary, to the other end of the ocular conjunctiva before the other sutures are introduced.

In **Allport's** case, following a railroad accident, there was a depressed fracture of the malar bone with a very adherent cicatrix resulting in complete ectropion of the entire lower lid. A first incision was made about one-fourth of an inch below the edge of the lid, and followed the curve of the same in its entirety. The integument over the cicatrix was well loosened and undermined in all directions. At the temporal end of the incision, a very large pedicled flap was cut in an upward and backward direction in the skin of the temple. The incision of the flap was such that when it was transplanted below the eye, the lines of the flap and the lower skin incision would correspond. The result was perfect approximation of the lower lid to the globe without much shrinkage. After interrupted suturing was completed, the underlying tissues were freed of all serum by rolling over the lines of suture a bit of roll gauze. By firm "rolling" a considerable amount of serum is expressed, which otherwise would be an excellent culture medium, or cause suture tension by swelling.

**Black** observed in a man, aged 25, marked eversion of each lower lid, with a similar condition of the puncta. He slit the lower puncta and made a vertical cut down each lid from the punctum. He then excised a triangle about two mm. in dimensions; this made a large punctum much easier to bring in contact with the eye ball. Ziegler's cautery punctures were made deep into the tarsal plate of each lower lid at a number of points; with the result that the lower lids rested against the eyeball in proper position, and the puncta drained the tears perfectly. The reporter emphasized the importance of a patent tear duct, if the best results are to be obtained by this method.

**ENTROPION.**—**Markel** reports satisfactory results in a case of spastic entropion of both lower lids by means of six punctures four mm. apart, and the same distance from the lid margin, with Ziegler's galvano-cautery.

**Herrenschwand** describes a case of congenital entropion of both lower lids, which at first sight seemed to be due to

chronic blepharitis, but proved to be an anomaly of development of all four lids. The anomaly was entirely due to over development of the orbicularis at the marginal portion of the lid. The tarsus was perfectly normal. The conjunctiva extended out over the edge of the lid, so that the lids appeared to have red edges. The inner edge of the margin was rounded off and the lids closed imperfectly. There were, besides, symmetric conjunctival cords of adhesion to the cornea; and the lacrimal puncta were absent. The tarsus was turned inward, not outward; the lids were shortened. Recurrence soon followed a canthoplasty; but a cure was effected thru excision of the greater part of the muscle of that part of the lid.

**PLASTIC OPERATIONS.**—To obviate the small but disfiguring notch frequently left after restoration of a divided lid margin, at the site of the wound or injury, **Duverger** has devised a method which has proved highly satisfactory. It consists in splitting the eyelid on each side of the wound and resecting a triangular area, cutaneous on one side, mucous on the other. The two raw surfaces are then superimposed and retained in position by sutures. Simple diagrams illustrate the article making the procedure readily intelligible. The author has applied the same method to senile ectropion, making a preliminary coloboma about the middle of the lower lid.

In **Lanier's** case a cut with a knife, beginning at the outer supraorbital margin 2 mm. above the canthus, severed the upper eyelid, while the blade was directed outwards; whence it was turned, making a circular incision completely destroying 2 or 3 mm. of the upper lid, and about three-eighths of an inch of the lower lid including the conjunctiva. The reporter was consulted several months after the injury, at which time a traumatic cataract dating from the injury was present. There was partial symblepharon corresponding to the denuded area around the eye-lids and a fistula which extended from the outer canthus thru the lower lid and across the cheek to the nose.

The following operation was performed: The eyelid was separated from the globe, and the defects covered with vertical stretched flaps of conjunctiva, stitched into place. The fistulous sac was dissected out, and after thorough scraping and washing with mercuric chlorid, was packed into the defect caused by the loss of tissue at the outer canthus. This also was covered with conjunctiva, leaving the skin defect of both upper and lower lids uncovered. This was subsequently remedied by transplantation of a piece of skin bearing a pedicle from the neighboring tissue on the forehead, slightly larger than the defect of both lids and like it in shape. The result was entirely satisfactory.

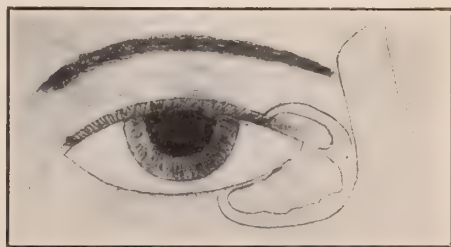


Fig. 4. Lanier's case showing lesion to be repaired and outline of flap.

**Posey** performed blepharoplasty upon a girl aged 22 years, for the restoration of the upper lid, which had been lost from orbital inflammation in childhood. The flap which was taken from the forehead included a small portion of the brow, with the view of creating a row of cilia upon the new lid. A mucous lining was provided by dissecting a small remnant of mucous

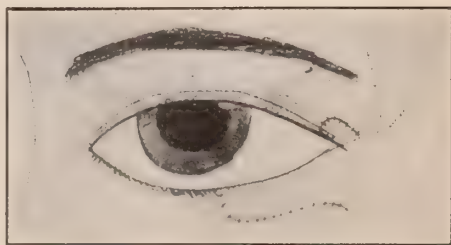


Fig. 5. Lanier's case showing flaps stitched in place and surface closed from which they were taken.



membrane which was confluent with the skin underneath the brow, reflecting it downwards, and sewing it temporarily to the lower lid. The reporter proposed removing the shrunken globe and placing a gold ball in Tenon's capsule. The artificial cilia, which would not be tolerated by a healthy eye, were intended as a cosmetic setting of an

artificial eye. He had deferred enucleation of the phthisic eye until the new lid had been properly formed, on account of the support it gave the flap.

**Komoto** reports good results in two cases of the Italian method of blepharoplasty. In the second case there was total ectropion, following acid burn of the face.

## DISEASES OF THE ORBIT.

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DENVER.

This section covers the literature from January, 1917, to July, 1918. Related topics will be found in the sections upon Eyeball, Tumors and Injuries.

**ANATOMY.** **Ochi** has taken up the comparative anatomy of the orbit in certain animals. But his paper is not yet available for abstract, and may be noticed under the heading "Comparative Ophthalmology."

**EXOPHTHALMOS.**—In **Hird's** lecture on exophthalmos, its causes and diagnosis, the material is well classified and comprises all the essential facts. It furnishes an easily comprehensible picture of orbital affections. **Jickeli's** case of acute inflammatory exophthalmos set in with symptoms resembling those of influenza. The eye was proptosed 4 mm. and there was diplopia. The accessory sinuses were normal. All symptoms disappeared in a week.

**Meyer-Huerlimann** reports a case of **Quicke's** disease in a woman of 51, which was characterized by acute circumscribed swelling of the face, the ear, the leg; and probably with subperiosteal exudation not only there but also on several ribs. There was swelling of the soft palate, and of the pharynx, an acute edema of the larynx, diarrhea; and a marked exophthalmos which developed very rapidly and disappeared quickly in first one and then the other eye. **Greig** reported a case of exophthalmos thru convulsive movements, in a marasmic child, aged eleven months. It was noticed that when crying all the voluntary muscles, including the orbicularis palpebrarum on both sides, were

thrown into a state of convulsive movement, while in addition, the eyeballs were protruded to such an extent that extrusion appeared to be imminent.

**Cross** reported a case of *symmetric proptosis* of both eyes, in a man aged 53 years; coming on suddenly, first in the right eye, and a few days after the left eye also became swollen. His vision was R. 6/12, L. 6/9. The movements of the eyeballs were impaired by the swelling. The conjunctiva was congested. The cornea was clear and the ocular fundus normal. Examination of the nasal sinuses was negative. No lymphatic enlargements. X-ray examination showed the orbits to be opaque, but the nature of the opacity was obscure. The author thought it to be a form of lymphoma, a proliferation of lymphoid cells producing hyperplasia and hypertrophy of the orbital tissues, possibly due to some parasitic or other primary cause. Blood examination excluded leucocythemia and chloroma.

**PULSATING EXOPHTHALMOS.**—**Cailaud** reported a case of bilateral traumatic pulsating exophthalmos in a soldier aged 35 years, due to a war injury. A fragment of shrapnel entered the left maxilla, traversed the maxillary sinus and became lodged in the retropharyngeal region. Attempts at removal failed. The patient at first lost consciousness, and after regaining his senses, he noticed that he could not see



with his left eye. Two weeks later his left eye was proptosed. After several days the right eye became prominent. Examination four weeks later showed both eyes proptosed and pulsating. There was chemosis, and the lower lids were edematous. The ocular movements were limited, especially outward. On auscultation over the globe, a light blowing murmur was heard. Ulceration of the left cornea set in. Both internal carotids were ligated. The symptoms at first ameliorated, but the patient succumbed several days later from cerebral hemorrhage.

**Mayou's** patient, a soldier, was wounded by shrapnel entering behind the right mastoid process, and becoming lodged behind the left coronoid process of the temporal bone. When he presented himself he had a right facial paralysis with proptosis of the right eye, and pulsation could be felt by pressing the globe into the orbit. Ocular movements were limited and the ciliary vessels were dilated. A bruit could be heard over the orbit and head. Both eyes had corneal nebulae. The case was one of arteriovenous aneurism, and was not improved by ligation of the internal carotid. **Sattler** reported a case of pulsating exophthalmos.

**Augstein** described a case of bilateral pulsating exophthalmos, caused by a wound in which the muscles of mastication and the sternomastoid of the left side were completely torn to pieces, the ramus of the lower jaw, the malar bone and the joint destroyed, and the facial nerve paralyzed. Later pulsation of the carotid could be felt, the veins of the upper eyelids were distended and tortuous; and both eyes protruded, the right 23 mm., the left 20 mm. The exophthalmos remained the same upon changing the patient's position. The intraocular tension was raised. A pulsation, synchronous with the beat of the heart, was felt by the hand placed on the closed lids. Over the entire skull a vesicular murmur could be heard, synchronous with the carotid pulse. After ligation of the carotid artery the exophthalmos and pulsation subsided.

Subsequently fine pigment anomalies appeared in the retina, together with whitish lines of opacity and punctate hemorrhages in the left, although the vision remained normal in both eyes.

**Watanabe's** case of spontaneous pulsating exophthalmos occurred in a boy 19 years of age. Ligation of the carotid artery was performed with good results. **Key** reported a case of pulsating exophthalmos in a man aged 49 years who had received a severe blow with a club on the right side of the head two months before. Five days after the injury he noticed a slight protrusion of his left eye, which has gradually become worse. Pulsation of the globe, synchronous with each heart pulsation could be seen and a well defined bruit pulsation could be heard. The X-ray plate gave no evidence of injury. Digital pressure caused the pulsation to stop.

**Krauss'** case of exophthalmos was due to the enormous engorgement of veins in the orbital fat. The patient, a woman aged 59 years, with a negative family history, had a systolic blood pressure of 215 mm. There was no history of traumatism,  $V. = 5/15$  in both eyes. Retinal veins were engorged. Treatment consisted of rest, iodides, nitrites, and intermittent compression of the common carotid. There was a gradual subsidence after which the patient complained of a sudden, severe pain in the right eye, followed by intense proptosis of the right eye, and marked exophthalmos in the left eye. The pulsation in the right eye became pronounced, but was absent in the left eye. *Ligation of the ophthalmic vein* was resorted to by the supraorbital and retrobulbar routes. (See O. Y. B., v. 13, page 306.) **Dodd's** case of unilateral exophthalmos was first noticed a month after a severe blow on the side of the head. The eye was proptosed 5 mm., with no other symptoms whatever.

**Bedell** reported a case of traumatic pulsating exophthalmos in a woman, aged 66 years, who had for three weeks complained of severe pain over the right parietal region, accompanied by

nausea and vomiting. A history of injury to the right parietal region was elicited. Vision and fundus were normal. Several months later she complained of orbital tightness and diplopia. The eye proptosed and pulsated. A distinct bruit could be heard over the globe extending to the right temporal region. The case was seen before proptosis occurred, and the fundus changes noted during the development of the symptoms. Ligation of the carotid was followed by recovery of ocular position and movement, but with optic atrophy.

For pulsating exophthalmos, **Golovin** advocates ligation of the superior ophthalmic vein.

The clinical history of five cases operated upon is given and the author concludes as follows: Ligation of the superior ophthalmic vein is under all circumstances less dangerous than ligation of the common carotid. It is indicated particularly where the aneurism has involved dilation of the veins of the face. Where the cerebral symptoms (noises in the head and paralysis), are prominent, ligation of both the ophthalmic vein and the common carotid are indicated.

In all cases where, along with the symptoms of aneurism, there may be the smallest suspicion of a neoplasm of the orbit, resection of the outer wall of the orbit is called for to begin with, in order to provide free access. If there should be a tumor, its removal can be proceeded with. If the condition turns out to be a purely vascular distention, the access is sufficiently free, even if the dilated vessels should lie to the inner side of the orbit. In cases where the symptoms of aneurism leave no doubt as to the diagnosis, he considers the resection of the outer wall of the orbit unnecessary; as thru a moderately sized incision made below the eyebrow, sufficient access can be obtained to effect the ligation of the vein without difficulty.

In cases of recurrence after, or failure from ligation of the common carotid, ligation of the vein is necessarily indicated as preferable to ligation of the carotid of the other side. If there

should be an aneurism on both sides, the indication would be ligation of both superior ophthalmic veins, not ligation of both carotids.

**EXOPHTHALMIC GOITER.**—**Means** and **Aub** studied exophthalmic goiter from the point of view of basal metabolism, and showed the importance of such work from a diagnostic as well as from a prognostic point of view.

**McDonald** gave the history of six cases of exophthalmic goiter and was impressed by the variability of different symptom groups. He reviews the investigative work of a number of authors and concludes that this experimental work has shown dependent relations between the thyroid and the adrenal activities in Graves' diseases; the presence of the thymus; the relation and coexistence of the thymus and the suprarenal; and the effect of the increased secretions of individuals of the vagotonic or sympathetic makeup. When their findings are applied in an attempt to interpret cases of exophthalmic goiter, we can see the basis for the variability of type in this disease.

**Reede** has outlined the continuity of events leading up to exophthalmic goiter as follows:

(1) A period of infection leading up to hyperplasia of the thyroid and goiter, with or without symptoms, and beginning often in childhood. (2) A period of increased physiologic demand inducing hyperthyroidism. (3) The stage of rapid metabolism and highly sensitized bodily functions known as hyperthyroidism. (4) The period of emotional stress in which originate the stimuli to suprarenal secretion. (5) The stage of suprarenal oversecretion, with the appearance of general sympathicotonic symptoms, and the localization of the brunt of the effect on the cervical sympathetic. (6) The stage of degeneration, and the breaking down of the cardiac, mental, visual, nervous, thyroid, and suprarenal mechanisms.

**Witherspoon** reviews the literature and pleads for early diagnosis of exophthalmic goiter. **Welt-Kakels** presented a patient, a boy 14 years of age with exophthalmic goiter, who gave a



history of emotional shock. **Levison** in his observations upon certain types of toxic goiter, remarks that he is convinced that exophthalmic goiter is a surgical disease and should be operated on early, before permanent damage is done to the heart and other organs. **Olivieri** and **Ronchi** give the details of injecting boiling water into the thyroid gland. They injected 10 cc. of boiling water alternately into each one of the lobes of the thyroid at different points each week. The improvement was marked, the nervousness subsiding; as also did the tachycardia, exophthalmos and goiter in notable degree.

**Suker** has described a new *ocular muscle symptom*, in exophthalmic goiter, which he designates as "deficient complementary fixation in lateral eye rotations." After extreme lateral rotation of the eyes, to either side, with the head fixed and with fixation of an object at about 3 or 4 feet, on attempting to follow this fixation point as it is rapidly swung into the median line, one of the eyes—it may be either—fails to follow the other in a complementary manner into proper convergence and fixation for this point, when it is brought into the median plane. Either the right eye or the left eye makes a sudden rotation into the fixation with its fellow, but before it does so, an apparent divergent strabismus is manifest. In exophoria this divergence is more marked, in esophoria less so.

**Simpson's** paper deals with *Röntgen ray treatment* of exophthalmic goiter. His conclusions are: (1) That X-raying the thyroid gland alone will sometimes relieve the symptoms of Graves' disease. (2) That the blood count, fluoroscopic, and X-ray picture examinations are often misleading, and should not have too much effect on prognosticating the favorable and unfavorable cases. (3) That the X-ray will quickly and painlessly atrophy the thymus gland; and for this reason should be the method of choice in all cases of exophthalmic goiter where enlarged thymic glands are suspected. The same author, in a later paper, relates the history of a number of cases

treated with X-ray. **Hernaman-Johnson** speaks highly of the effect of the X-ray in cases of exophthalmic goiter. In order to obtain the quickest results, sittings must be given three times weekly at first, comparatively small doses being employed. The X-rays particularly influence the pulse rate, tremors, and sweating, and have less influence upon the physical manifestations of the disease, as exophthalmos and thyroid enlargement.

In **Knapp's** case of *suppuration of both corneas* in a patient, aged 35, suffering from exophthalmic goiter, the cornea of the left eye sloughed and the eye was eviscerated. The cornea of the right eye, in the lower half, was infiltrated with pus. It was treated with irrigations, applications of argyrol and bandaging, without any result. The eyelids were then sutured, following the suggestion of Priestley Smith. The upper part of the cornea cleared, a small perforation took place below, and a necrotic plug was cast off. An optical iridectomy was performed upward. The vision was 6/200.

**ANEURISM.**—**Shannon** reported a case of aneurism of the internal carotid artery, and describing its effect upon the patient's vision said: "Two days previous to the examination, the patient, a woman, aged 52 years, noticed that the vision of the right eye was blurred. Vision, counting fingers at 3 feet. Pupillary reaction, normal. Media clear. Fundus normal, but the visual field showed a small central scotoma of the dumb-bell variety. The Wassermann test was negative. Examination of the sinuses and an X-ray of the skull proved negative. There were never headaches or cerebral symptoms at any time. The condition in the eye grew gradually worse; the blind areas in the field increased in size, and the color fields disappeared. Finally the patient succumbed to an attack of apoplexy. The autopsy discovered an aneurism of the right internal carotid artery, near the circle of Willis, which had burst, flooding the third, fourth, and lateral ventricles. The aneurism had caused pressure upon the right optic nerve."



**ENOPHTHALMOS.**—**Jickeli's** case of traumatic enophthalmos occurred in a boy of eighteen years of age after having been struck on the left temple and brow by a brick. Some days later he noticed that his left eye had become smaller and that he had double vision, although the eyeball was uninjured and the vision normal. Accessory sinuses were normal. The author concludes that, the immediate onset of enophthalmos and diplopia, as well as the larger left pupil, the lessened power of accommodation, the narrowing of the palpebral fissure, the continued contraction of the pupil in the dark, and the reduction of the corneal and conjunctival reflexes, could be explained only thru a change in the suspension apparatus of the globe, caused by a sudden stretching, pulling and partial laceration of the fascia, which enabled the muscles to retract the globe so that its movements resulted in disparate retinal images.

**Komoto and Hari** reported a case of *traumatic enophthalmos* upon which a *Krönlein operation* was performed. During the course of the operation a thin, tough strand of connective tissue was found attached to the posterior scleral wall, and the tension thereon caused the enophthalmos. **Lutz** reported a case of congenital enophthalmos in connection with complete absence of abduction, and retraction of the eyeball in adduction. A number of photographs are used as illustration, as well as a reproduction of an X-ray plate showing opacity in right orbit, indicating increased ossification in the bones in this situation. According to the patient's history, he suffered from fever early in life; which possibly led to an inflammation at the apex of the orbit (periostitis), and caused paralysis of the abducens and retardation of the development of the orbit.

**ORBITAL CYSTS.**—**Zentmayer** presented a case of microphthalmos with orbital cyst in a boy aged 17 years, who was born with the present condition of his left eye, except that the swelling about the eye had increased since the twelfth year. There was a swelling of the lower lid, with ectropion and ob-

literation of the culdesac. A globular tumor could be felt thru the lid, which seemed to be attached toward the temporal side and was but slightly movable. In the upper inner portion of the orbit there was a small rudimentary globe having limited movements. The cornea was 4 mm. in diameter. The X-ray did not show the cyst. In the right eye there was a partial coloboma of the optic nerve.

**Burns** described a case of dermoid cyst in the orbit of a girl, aged 8 years, following an injury to the head, six years before. The eye was displaced forward and outward, and there was diplopia. Vision was almost normal. The X-ray examination showed a tumor involving an area in the orbit, temporal fossa, and cranial fossa on the right side of the skull. The tumor was removed and recovery was uneventful.

**Koyanagi's** case of *blood cyst* in the orbit and lids, occurred in a woman, aged 25 years. There was a swelling of the upper left lid, which communicated with the orbit and which proved on extirpation to be a large blood-cyst, containing two roundish thrombi which had undergone chalky degeneration. The outer wall of the cyst was composed of connective tissue and the inner wall of the epithelium.

**TENONITIS.**—**McBean's** case of serous tenonitis occurred in a woman of sixty-seven. She had a paralysis of the external rectus muscle, with edema of the ocular conjunctiva. Under the administration of iodides and salicylates it soon cleared up. A month later she awakened with intense chemosis of the left ocular conjunctiva, so that she could not close the eyelid. A Snellen suture thru the lid was applied, and the treatment with iodides and salicylates continued, together with multiple puncture of the edematous conjunctiva and a pressure bandage resulted in a cure. His second case was one of orbital cellulitis occurring in a child, 3 years of age, who had swelling of the left eyelid and marked proptosis and a temperature of 102°. There was rhinitis on that side with watery discharge. Deep orbital probing did not reveal any pus. A few days later a

swelling formed in the region of the lacrimal sac. No pus was found. Recovery resulted in a few weeks.

**CELLULITIS.**—**Mongel's** case of orbital cellulitis with *optic neuritis* occurred in a man, aged 23 years, who previously had an attack of influenza. In the right eye there was intense chemosis and edema of both lids. V. = 23/200. There was proptosis down and out, and absolute suspension of ocular movements. The cornea was clear. The media were transparent and the fundus showed a typical picture of optic neuritis. A large amount of pus was evacuated thru an incision along the orbital floor toward the nasal side.

After a few days the eye became normal. Vision 20/20. Since the X-ray of the sinuses was negative the only explanation could be metastasis or endogenous infection from gripe.

**Fox** reported a case of orbital cellulitis occurring in a child aged 5 years. Postnasal examination showed a mass of adenoid tissue. An injection of staphylococcus and streptococcus vaccines was given. Resolution resulted without surgical interference. His second case was in a boy aged 9 years, who had bilateral pain, marked exophthalmos, edema, and a temperature of 104°. No history of any injury to the head could be found; but an open infected wound of the left ankle was found. After treatment of the ankle wound with the evacuation of pus from incisions in the culdesacs of both conjunctivas recovery was rapid.

**Terson's** case of orbital cellulitis occurred in a child, aged 3 years. A purulent *rhinitis* preceded the orbital inflammation. After nasal treatment and inunction with colloidal silver ointment, the temperature became normal and the swelling disappeared.

**Chance** reported the case of a negress of about 35, who had some fifteen years ago symptoms of neuroretinitis, and a proptosis which was then believed to be caused by orbital tumor or cellulitis. Large doses of iodides allayed the symptoms and reduced the proptosis. The patient continued well until a short time ago, when in addition to protrusion of the globes accompanied

by immobility, there was enormous chemosis. This chemosis was so great and the cornea so cloudy that the eye-ground could not be seen. There was a yellowish conjunctival discharge containing the pneumococcus. X-ray examination and Wassermann reaction were negative. With the usual local treatment and inunction of iodid of mercury the discharge became watery and the proptosis and the chemosis subsided. The author considered it a case of conjunctivitis with infiltration of the orbital tissues.

**Mayou** reported several cases of orbital suppuration. His first case was one of suppuration of both orbits, as the result of a boil on the bridge of the nose. On the right side the abscess was subperiosteal and the ethmoid cells became secondarily infected. On the left side the pus was confined to the cellular tissue of the orbit. The second case was a case of frontal sinus suppuration simulating a lacrimal mucocele. Case three was an abscess in the right eyebrow simulating frontal sinus suppuration. In his fourth case there was suppuration in Tenon's capsule. The right eye was proptosed and pushed straight forward, and the conjunctiva edematous; the iris was discolored. Vision was reduced to counting fingers. The proptosis increased. There was marked iritis and a purulent exudation in the vitreous. The abscess burst thru the conjunctiva between the insertions of the external and the superior recti. There had existed at the same time an inflammation of her right ankle-joint which subsided without suppuration. His fifth case was also one of inflammation of Tenon's capsule, pyemic in character, secondary to cystitis due to staphylococcus aureus. Edema of the anterior surface of the lens and purulent matter in the vitreous. In this last case there was suppuration in a lacrimal sac presenting above the tarsal ligament.

**Roberts** and **Harris'** case of *empyema of ethmoid and frontal sinuses*, with perforation of the inner wall of the orbit, occurred in a boy, 16 years of age. The left eye was completely closed by an intense swelling of both



lids. Pus was evacuated thru an incision of the left eyebrow, and the frontal sinus was opened. The ethmoidal cells were opened by the nasal route. **De Kleijn** advocates the endonasal treatment in affections of the frontal sinus complicated with orbital lesions.

**Posey** reported an unusually large *mucocoele* of the frontal cells, which had simulated an *osteoma* of the right orbit. It was drained thru an incision under the brow. The frontal cells had perforated into the nose. His second case was that of a *prelacrima* tumor resulting from disease of the anterior ethmoidal cells. An orbital incision and drainage of the cells into the nose, by breaking thru the ethmoid plate and inserting a drainage tube, effected a cure.

In **Prendergast's** case of ethmoiditis in a child, aged 6 years, complicated by unilateral exophthalmos, the ethmoidal cells and the maxillary antrum were drained and a cure effected in three days. **Dolger** reported a case of orbital abscess due to suppuration of the ethmoidal cells in a man aged 27 years. The proptosis and diplopia disappeared promptly after endonasal treatment. **Stein's** case of proptosis was due to an infection received while swimming. Pus was found under the periosteum of the roof of the orbit and in the ethmoid and the frontal sinus.

**Stilwill** and **Coover** reported a case of unilateral proptosis in a boy, probably caused by an abscess in the orbit. **Miller's** case of orbital abscess within the muscle cone was due to an infection from the maxillary antrum. The abscess ruptured immediately internal to the attachment of the superior rectus muscle. Exploration of the abscess with a probe showed it to be in the muscle cone. In orbital complications of frontal sinus disease **de Kleijn** prefers endonasal treatment. In acute cases, **Burger** prefers endonasal treatment, and in chronic cases, endonasal treatment of the sinuses with opening of the orbit. **Guix** also advocates endonasal treatment in acute orbital inflammations. **Posey** exhibited a case showing excellent cosmetic and visual results a year after operation

for extensive *mucocoele* of the frontal and ethmoidal cells.

**ECHINOCOCCUS CYST OF THE ORBIT:**—In **Calderaro's** patient, a girl of four years, an echinococcus cyst developed following a blow on the forehead. When first seen, six months after the swelling was first noticed, the eye was destroyed and the tumor projected beyond the lids to the size of a mandarine orange. There was an obscure sense of fluctuation. Blood examination showed 18% of eosinophiles, but after eliminating a number of round worms, this was reduced to 10%. Guedini's biologic reaction was positive, but the intradermal reaction (Cosoni's) was doubtful. The entire cyst and the stump of the eye with a long piece of the optic nerve, were removed and examined microscopically. Marked local eosinophilia in the cyst wall was found, but not in the ocular tissues. The condition of the globe and the nerve could be explained as a result of pressure, and there was no evidence of any inflammation due to the toxicity of the hydatid liquid. **Krivososoff** reported a case of echinococcus of the orbit.

**LARVAE IN ORBIT.**—**Murzin** also reported a like case affecting the orbit. **Azer Wahba** reported four cases of fly-blown orbit, three of them in children of 18 months to 3 years. The appearances resembled panophthalmitis, except that the lids were more extensively involved and large holes were found in the tissues. There was discharge of pus in all cases; and in the children this contained gonococci suggesting that a gonococcal conjunctivitis had preceded the invasion of the tissues by the larvae. The number of worms varied from three to fifteen and one of the holes left, from which three had been extracted, was large enough to admit the end of the little finger.

**TUBERCULOSIS.**—**Yebara** found, in a 9-year-old girl, a right sided exophthalmos with slight inflammation of the lower lid, due to a tumor-like miliary tuberculosis of the orbit. During the enucleation, the orbital tumor was found to be a tubercular inflammatory process, lying closely behind the eye. In all probability, the disease origi-



nated, not from the periosteum, but from the sheath of the optic nerve.

**SYPHILIS.**—**Cantonnet** and **de Saint-Martin's** case of gumma of the orbit occurred in a man aged 34 years. The eye was proptosed. The ocular movements were limited in all directions. Injections of cyanid of mercury and the administration of iodids resulted in a cure in fifty days.

**ANEURISM IN CAVERNOUS SINUS.**—**Fisher's** case of aneurism of the cavernous sinus, occurred in a woman aged 59 years. The patient suddenly felt giddy and fell down some six steps. She remained unconscious for five hours, and vomited on recovering her senses, and was sick occasionally during the next two or three days. There was no positive evidence of a basal fracture. On the third day after the fall, the woman's right eye became prominent. When seen seven weeks later, there was marked pulsation of the eyeball, and a thrill was felt. A loud bruit was audible over the eyeball and the right frontotemporal region. There was paralysis of all extrinsic muscles of the eye, except the superior oblique. The pupil did not react to light. After rest in bed and the administration of iodides the vision rose from 6/24 to 6/9.

**THROMBOSIS OF CAVERNOUS SINUS.**—**Bonacker** reported a case of thrombosis of the cavernous sinus, complicating an acute mastoiditis. The patient recovered with perforation of the cornea and luxation of the lens.

**LOSS OF ORBITAL MARGIN.**—In **Knapp's** case of fracture of the frontal bone, in a boy ten years of age who had fallen two stories, there was a defect in the anterior surface of the frontal bone, involving the orbital margin. The eye was pushed down and out and there was a soft circumscribed prominence in the upper and inner part of the orbital opening, corresponding to the frontal sinus. There were no eye or brain symptoms. This mass could be reduced on pressure without causing any pain. The diagnosis seemed to lie between meningocele, hernia of orbital fat, or distension of the lining of one of the accessory nasal sinuses.

**RODENT ULCER OF ORBIT.**—**Turner** reports the history of sixty-six cases of malignant disease treated with radium. A description of a trocar for the introduction of radium tubes is appended. In one of his cases, a man 60 years of age, with an extensive rodent ulcer involving the orbit, a good cosmetic result was obtained with scarcely any subsequent contraction. The writer prefers to divide the necessary dose into two or three, administered at three or four days interval.

**RETAINING FLOOR OF ORBIT.**—**Van Hook** describes his method for retaining the floor of the orbit, in resection of the superior maxilla. The ordinary resection operation is modified as follows: A wire saw passes under the malar bone, to the anterior part of the sphenomaxillary fissure, thence traversing the cavity of the orbit to the lacrimal groove, entering the nose through a perforation of the shell-like bone and emerging from the bony nasal frame-work. Six illustrations accompany the original paper.

**PROSTHETIC OPERATIONS.**—**Adam** recommends the implantation of a piece of fat, taken from the thigh, to form a better stump for a prosthesis after enucleation or evisceration of the eyeball (See p. 156). He exhibited a large number of prostheses devised for the varying conditions that result from battle-wounds; for contracted orbits, for partial or complete loss of the lids, for funnel-shaped cavities in the orbit, for coincident ptosis, and for use in the intervals between plastic operations on the lids.

**Franke** describes his modification of **Oehlecker's** procedure for the formation of a stump after enucleation or evisceration, consisting in using a small apophysis of a tarsal or carpal bone. As this procedure cannot often be made use of for lack of material, he conserves his material in Ringel's fluid. In order to fasten it, he uses three sutures, which he passes deeply from above downward without engaging the muscle in the suture. **Zarzycki** uses a piece of bone and its periosteum obtained from the tibia for implantation into the capsule after enucleation.

**Sourdille** introduces a skin graft, 28 by 30 mm. in diameter, and including a thin layer of fat, into Tenon's capsule. This fat is fixed by the threads previously passed through the recti tendons. In injuries complicated by palpebro-conjunctival or orbital lesions, especially where the malar bone or outer wall of the orbit has been destroyed, he has used bony grafts taken from the surface of the external maleolus. **Aymard** employs spheres constructed from costal cartilage as prosthesis for the eye. The cartilage sphere is placed inside of Tenon's capsule and sutured. He then sutures the conjunctiva.

**Zentmayer** exhibited a case of contracted socket in which a double Maxwell operation had been performed five years previously. The pedicle grafts in the culdesac had not shrunk, and the patient was wearing an artificial eye with satisfactory results. The upper lid was so distorted, and so matted and drawn into the orbit, that the "Maxwell" procedure did not seem indicated. He then proceeded by the method devised by Schwenk (see Oph. Y. B., 1916, p. 312).

**Carlotti** and **Bailleul** have devised a new operation for improving the appearance and mobility of artificial eyes after removal of the eyeball. This consists in (1) removing a piece of costal cartilage with its perichondrium; (2) removing the eye; (3) dissecting a pedunculated flap of skin from the upper lid and passing it into the orbit through a button-hole at the external canthus; (4) suturing the skin flap to the cartilage; (5) suturing the recti muscles to the cartilage; (6) closing the wounds in the lid and conjunctiva. **Schwenk** showed a case of contracted socket in which he devised a new feature of transplanting a flap with pedicle. (See A. J. O., Vol. 1, p. 55.)

**CONTRACTED SOCKET.**—**Posey** referred to the case of a young man whose orbit has been almost obliterated as the result of a lime burn. The lower culdesac, restored by the Maxwell method, was amply deep; but there was some drawing downward of the outer half of the lower lid. He had observed this

complication in all of the cases operated on by this method, and thought that the author had directed that too wide an area of skin be taken from the skin below the lid. In future he will so modify the incision, that, instead of a width of 10 mm., 7 or 8 mm., suffices. He had obtained a deep upper culdesac by splitting the external canthus; and implanting into the upper part of the socket, a long skin flap taken from the lid just below the brow. The outer canthus was repaired at the time of operation, by deep sutures tied over a button. A Fox conformer was kept constantly in the socket.

In **Allport's** operative procedure for the relief of contracted socket, the socket is opened and separated from the lower lid. A piece of block tin, perforated and in half-moon shape, is inserted into the lower portion of the socket. A Thiersch graft, large enough to cover the tin on both sides, is made and sutured to the tin, raw side out, the sutures passing through the perforations at its upper border. The graft covered tin is now forced into the lower culdesac of the socket. The lids are sutured to assist in holding the graft in position. In eight days the block of tin is removed, cleaned and replaced without sutures. In a few weeks the same operation can be performed on the upper lid. **Heckel** presented a patient on whom he had performed a plastic operation for enlargement of the right socket by means of a Thiersch graft.

**MASKS FOR DEFORMITIES FROM FACIAL WOUNDS.**—**Wood's** richly illustrated paper, deals with the history of four cases, in which he modeled masks for covering the facial wounds. When the surgeon has done all he can to restore function, to heal wounds, to support fleshy tissues by bone-grafting and to cover areas by skin-grafting, a casting is made of the patient's face in plaster of Paris. Having obtained the mould and dried it, the next stage is to French chalk it, and take from it a cast or plasticine squeeze, which provides a positive model of the patient's healed wound and the surrounding normal tissue surface. This model is developed



by sittings of the patient, and this stage is completed by taking another cast—a negative.

The manipulator reconstructs the destroyed features from the model taken from this negative mould, by building them up to match the corresponding or adjoining features, or from pre-wound photographs. A cast is then taken of this. Further manipulation is required for the fitting of an artificial eye, and the mask, in plaster, is complete. From this an electrotype plate is deposited. It is of pure copper,  $1/32$  of an inch in thickness. The fittings for the glass eye and attachment are fixed, and it is finally well covered with an electric deposit of silver. The attachment of the plate to the face is made by strong spectacles, spirit-gum, or ribbons. The plate is now pigmented to match the complexion of the patient. The eyebrows are painted and the eyelashes are made of thin metallic foil.

**Coulson** described a rapid process in making an orbital prosthesis when cicatricial bands and bony lesions have changed the orbital cavity. A putty-like product, called "pastelline" is employed to obtain a mould of the orbit. **Ramsey** uses vulcanite. It can be moulded with care and painted to harmonize with the surrounding parts of the face. The parts to be replaced are modelled in wax from which a plaster of Paris impression is taken. The soft rubber is then moulded on the plaster of Paris, and vulcanized. The artificial eye is cemented to the vulcanite lids. After these have been colored to match the neighboring parts, the prosthesis is attached to a spectacle frame.

**Valois** and **Rouveix** call attention to the importance of getting the whole moulding of the orbital cavity in one step, not only of the surface of the orbit but also of the transition folds. Plaster of Paris, or rather alabaster, is used by means of a small funnel with a large opening for the admission of the liquid plaster. On the side opposite

to this funnel is a convex part reproducing the inner surface of the eyelids. From this mould a counter-mould is obtained having the exact aspect of the empty orbit. The prosthetic eye is made of caoutchouc or vulcanite, which transmits the least movements of the eyelids, or of the fundus of the cavity.

In **Valois'** patient, a workingman, the eyelids, the bulbar and palpebral conjunctivas and the cornea, were burned by molten metal. The eye was eviscerated. The end result was total symblepharon. Subsequent operation was refused. A mould of the orbital region was taken and studied. A zone was located in which active movements were present and a zone of relative fixation was noticed. A double prosthesis was constructed, the one covering the fixed area or defect of the orbit and lids; and the second a glass prosthesis attached to the first. The double prosthesis is held in place by a spectacle frame. The glass eye receives its motility by the movements of the scleral stump thru the eyelids.

**Lauber** and **Henning**, after destruction of the eye, removed the lacrimal gland, the conjunctival glands and the accessories in order to prevent secretions. Necessary plastic operations upon the orbital border were made to insure the retention of the prosthesis. A plaster cast is given to the patient, which furnishes him the model for the prosthesis, made of a plaster mass.

**EXPLOSION OF ARTIFICIAL EYE.**—**Weidler** reported a case of explosion of a Snellen artificial glass eye in the orbit. The patient, a woman aged 45, had worn reform eyes for the past ten years. For a week before the eye exploded the patient suffered intense pain in her head, and the socket discharged pus. After working in her kitchen over a hot gas stove, there was suddenly a peculiar explosive noise in her head, which was followed by pain in the socket. When the broken eye was removed, a hole was found in the central part of the rear surface about  $4 \times 6$  mm. in size. (See also p. 154.)



## TUMORS

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This section reviews the literature from January, 1917, to July, 1918. Certain benign tumors are mentioned in the sections relating to the regions in which they occur, as cysts in the anterior chamber under Anterior Chamber, subconjunctival cysts under Conjunctiva, etc.

**LACRIMAL TUMORS.**—**Alt** describes the microscopic structure of a partly *pigmented nevus* of the caruncula lacrimalis. The arrangements of the nevus cells in the tumor gave the impression that they had their growth from the deeper connective tissue parts towards the epithelium. Very few nevus cells proper contained pigment, the larger amount of chromatophores lay in the small layer of connective tissue. This seems to support Ribbert's view, that nevus cells are of connective tissue origin, rather than Unna's opinion that they are derived from the outer epithelium.

**Pfingst** removed a mass from the region of the lacrimal gland. It extended well back in the orbit, measuring half an inch in length, and weighing three and a half drachms. Histologically, the growth resembled a salivary gland. It was benign and of mixed tissue. The tumor, which had been present about three years, was observed in a male, aged 48 years. A case of lacrimal tumor is also presented by **Jocqs**. **Urayama** discusses lymphoma of the tear sac with elephantiasis of the upper lid.

**TUMORS OF THE LIDS.**—*Sarcoid* of the eyelid is reported upon by **Derby**; the pathologic examination is by **Verhoeff**. The authors were unable to find in ophthalmic literature any reference to "sarcoid," which they use in the restricted meaning given it by Boeck in 1899. The accompanying case history is that of a female, aged 25 years, from whom a small growth in the outer half of the right upper lid was removed. Three months later, there was recurrence, at which time a more complete excision of the parts was done, with no return. A very complete record of

the pathologic findings, a full discussion of the subject, together with some twenty-four references follows. The paper is of unusual interest, and should be read in the original, as it does not lend itself easily to abstract.

**Prevedi** describes a transparent cyst of the ciliary margin of the lids. **Castresana's** contribution is on congenital *dermoid* of the lid. **Levitskaya** reports on an extensive lymphoma of the cul-de-sac of the upper eyelid, penetrating into the orbit.

An Italian, aged 50 years, was exhibited by **Holloway**. The patient was first observed March 25, 1915; at which time there was present a large *epithelioma* about the internal canthus, involving the inner portion of both lids. Beginning at the middle of the lower lid, there was an ulcerating area the size of a five-cent piece. Attached to the inner edge was a flap-like mass partially covering the globe. A rather smaller area involved the upper lid. An extensive curettement and application of pure carbolic acid were followed with satisfactory results. Recurrences three months later necessitated a second and third curettement, followed by three applications of radium. At the time of reporting, about two months later, the eye looked well with only about 5 mm. of the outer extremity of the lower lid remaining.

**Jessop** observed a man, aged 55 years, with an *epithelioma* at the center of the left upper lid. The accessible parts were removed, and 10 mg. of the pure radium bromid was applied unscreened, for one hour. No recurrence in two months. The patient was an X-ray worker who had lost all fingers of one hand. Of the three cases of *epithelioma* of the lower lids ob-

served by **Katayama**, two were at the canthus. In **Johnson's** second patient, a case of epithelioma of the cheek and eyelid, in a female aged 50 years, was of four years duration. The fat and Wolff graft were taken from the abdomen. There was no recurrence for six months.

In view of the relative frequency of epithelioma due to certain irritants, **Herz** reports a case in a man aged 56 years. The growth, one centimeter in diameter, was at that part of the nose where his tortoise shell spectacles rested. The mass was excised with satisfactory results.

The occurrence of two different types of malignant disease, in the same patient, within a year, was **Valentine's** unusual experience. A female, aged 55 years, had an epithelioma of the lid removed. One year later, vision of the left eye failed. Examination revealed an intraocular growth. The enucleated eye revealed a mass 9x10 mm. One pathologist stated that it was a glioma. A further examination found it to be a fairly typical leucosarcoma. The author does not believe there is any connection between the two conditions.

**Johnson** observed a squamous celled sarcoma, involving both lids, the ball of the right eye and extending downward on the nose. The growth began ten years previous, in a female, aged 65 years. Complete exenteration of the orbit, removal of all affected parts, and filling in of the orbit with fat, from the thigh, and swinging into place a large skin flap from the forehead was the surgical procedure. Two years after the operation there was no evidence of recurrence. **Kosima's** patient was a man, aged 41 years, with *bilateral endo-thelioma* of the lower lids. Death ensued from brain tumor.

**TUMORS OF THE CONJUNCTIVA.**—**James** and **Trevor** report the clinical histories of two cases of *hemangioma* of the palpebral conjunctiva forming pedunculated tumors. One patient was a youth, aged 17 years; the second a girl, aged 13 years. The term "nevus" used in the pathologic reports on these two cases has been applied to tumors of

which the strictly correct description should be "hemangioma simplex." The term nevus is applied commonly to vascular tumors without regard to their more intimate structure. It is generally agreed that a simple vascular nevus is a congenital malformation rather than a true neoplasm.

The cases here described belong to the class of true blastomas, and consist of large endothelial cells arranged in many layers around spaces or tubules containing blood. In both cases, the growths are slightly lobulated, the second case more than the first. In both, there is an irregular area around the periphery of the tumors, and, in the second case, this bears on the outside the patchy remains of a covering of several layers of flattened cells belonging to the palpebral conjunctival epithelium. The authors found surprisingly few references in literature to similar cases.

*Angioma* of the conjunctiva of traumatic origin was observed by **Marin**. A female, aged 52 years, four years previous, injured the superior culdesac with a stick. The mass was about the size of a small hazel nut. At its outer part, the palpebral opening was occupied almost in its whole length by another growth of the size and shape of an almond. The two swellings were parts of the same tumor. A complete cure was obtained by three treatments with bipolar electrolysis at intervals of about three weeks.

**Fuchs** observed a *lymphangioma* at the site of a cystoid cicatrix. The eye had been removed on account of a mild endophthalmitis, ten days after an extraction of cataract. The lymphatics passed thru the scar onto the posterior surface of Descemet's membrane and the stump of the iris.

A highly pigmented *dermoid* was observed by **Shikano**, occupying the exact center of the lower palpebral conjunctiva. A Chinese farmer observed by **Kosima** showed a sausage-like thickening of the conjunctivas of both eyes, which were composed entirely of small lymphocytes. A rice granule was found in the left eye. *Papilloma* of the conjunctiva is discussed



by **Hepburn**. **Valli's** paper deals with experimental granuloma of ocular tissues.

**Crisp** states that primary epithelioma of the conjunctiva is not of extreme rarity. A peculiar feature is that they may exist and develop over long periods of time without involving vital structures. The sclerocorneal limbus is, perhaps, the most frequent site. A few cases described have developed on the base of an old pterygium. The case reported was in this position. It measured 4x5x2 mm. No recurrence was observed four months after removal. **Finnoff** made a microscopic diagnosis of epithelioma.

**Jean** presented a case of *sarcoma* of the conjunctiva which had occurred after removal. Radical measures were not resorted to owing to the fellow eye being practically blind. Complete exenteration is to be done. **Kurkoff** reports a case of epibulbar melanosarcoma. **Casolino's** patient had a lymphosarcoma of the bulbar conjunctiva. **Gallenga's** patient presented a lymphangio-endothelioma of the same tissue.

TUMORS OF THE CORNEA AND LIMBUS.—Very excellent microphotographs accompany **Marchi's** contribution on some rare observations of atypical trachomatous pannus of the cornea in the form of a tumor. One interested in the pathology of this subject should read the original. Two cases are described in which the masses approximated 10 mm. by 6 mm. and 2 mm. elevation. In one, the mass occupied the center of the cornea; in the other, the superior internal quadrant. Microscopically, the tumors were covered with epithelium somewhat altered in places. Round and oval cells gave the staining reaction for plasma cells. Here and there were numerous round hyalin globules. Bowman's membrane was completely destroyed. **Levitskaya** reports the rather unusual condition of *fibroma* of the cornea.

**Willett's** demonstrated Meanor's patient with melanotic sarcoma of the cornea. The patient, a male, aged 68 years, stated that a spot had been noticed on his right eye for ten years. When first observed by Meanor, the

growth was entirely corneal extending from the temporal limbus to the center of the cornea. Later melanotic spots appeared in the neighboring conjunctiva.

**Lamb** reports the microscopic findings in five cases of growths of a papillomatous nature. The condition was observed in patients ranging in age from 51 years to 75 years. One patient had multiple growths at the limbus; another at the nasal limbus; the third, at the temporal limbus; one, at the nasal canthus; and the fifth, at the center of the margin of the lower lid. Microscopically, these growths may be confused with spring catarrh, fibroma, tuberculosis, acanthosis nigricans, and, most frequently, with epithelioma. *Papilloma* is a benign growth possessing a great tendency to recur. They should be removed early, going well out into healthy tissue, and this to be followed by cautery.

A patient, aged 53 years, with a small pterygium-like growth at the temporal margin of the cornea was observed by **Koellner**. The mass was excised, but during the succeeding five years, six recurrences took place, following as many removals. This occurred at different points about the limbus. At the time of the last excision 10 mg. of mesothorium was employed, and six applications of from one to three minutes were administered daily for eighteen days. The patient was then allowed to go home without any particular change. On his return five months later the growth had entirely disappeared. Microscopically the tumor was an epithelial new formation, without blood vessels and benign in character, the epithelial prolongations not having penetrated the underlying connective tissue.

*Epithelioma* of a papillomatous type was the microscopic findings in **Stieren's** case of tumor at the limbus. The mass was observed in a man, aged 45 years. It was mushroom shape, and extended from the external canthus overlapping the cornea. **Marbourg** reports a patient struck at the limbus by a piece of coal, several years ago. There remained quite a little pigment, which



subsequently was examined by a pathologist, who reported an absence of melanosis. Two years after enucleation, the patient died from metastatic sarcoma of the liver.

**TUMORS OF THE IRIS.**—*Primary sarcoma* of the iris was observed by **Bell**. A man, aged 80 years, with a history of analytic stroke twelve years, and a trauma of the left eye two years previous, complained of severe pain and loss of vision. In the upper nasal quadrant, between the cornea and iris, and apparently involving the latter structure, was a mass 3x6 mm. Tension was 52 mm. The patient refused surgical interference. Six months later the mass had increased, tension was 90 mm., and the eye painful. The organ was removed at this time. Dixon's pathologic examination showed a primary melanosis of the iris, spindle cells predominating. The author concludes by stating: "I feel that the prognosis is always unfavorable when the sarcoma is excised. Iridectomy should be done only as an aid to diagnosis. I quite agree with Wood and Casey who, after a thorough investigation of the subject, came to the conclusion that, when the diagnosis of iris sarcoma is established, the globe containing the growth should be immediately enucleated. That they do recur sooner or later when excised and are apt to produce general metastases. I feel that it is not fair to jeopardize the life of the patient by a compromise in the treatment, and, after all is said and done, in my opinion the radical operation is by far the safest in the end."

**Gifford** reports his experience of having systematically treated sarcoma of the iris by *radium*. Some two and a half years later the unusual opportunity of securing the specimen for pathologic study was afforded. His observations presented much the condition described by **Levin** and **Joseph**, **Morson**, **Wassermann**, and **Prime**. The cells showed no mitosis or evidence of spreading into neighboring tissues. The author's comment on this form of treatment is that the iris offers very favorable conditions for treatment by *radium* or *ray*. The rays reach the growth

thru the clear cornea almost as if it were on a skin surface and the results of treatment are as open to observation.

Of the two accepted treatments, iridectomy and enucleation, the author quotes **Wintersteiner's** opinions in favor of primary enucleation, except under certain well defined favorable conditions. (1) Vision in the eye is good. (2) The iridectomy offers no obstacle to complete removal. (3) The tumor is small, slow growing, well defined and at the pupillary edge. It must not reach into the anterior chamber, touch the lens or cornea, there must be no other pigment flecks of the iris, and tension must not be increased. There is some danger of iridectomy producing metastasis, but this is also true of enucleation.

**Argañaraz** and **Belgeri** found in all about twelve cases of leucosarcoma in the literature. Their experience is one for every 80,000 cases. **Hirschberg**, one to every 85,000, while **Kotomo** reported one for every 3,500 cases. The case reported is that of a woman, aged 28 years, who eleven years previously suffered a traumatism over the right eye. At the time of observation there was marked inflammatory ocular disturbance. Histologically the enucleated eye showed a perithelial angiosarcoma.

**Ziegler's** patient, with sarcoma of the iris, was a male aged 55 years. The anterior chamber was obliterated on the nasal side due to a tumor mass springing from the root of the iris. Sections of the globe showed a large pigmented tumor, located between the iris and lens, and an equally large leucomatous mass extending subretinally from the ciliary region into the vitreous chamber.

**TUMORS OF THE CHOROID.**—The use of the term *melanoblastoma* as a group name for all tumors composed of melanoblasts or chromatophores, **Forman** and **Hugger** believe has the advantage of not placing any emphasis upon benign or malignant forms. This compels a more accurate study of the individual tumor. The authors give the results of their studies from the labora-

tory of pathology of the Ohio State University. Four specimens of malignant melanoblastomas arising in the choroid are recorded. Each illustrates one of the four stages of the disease: The small growth, with no marked symptoms; the type with marked pain, the one with extraocular involvement, and the fourth which has metastasized.

**Komoto** contributes to the knowledge of primary uveal tract *sarcoma* with a report of 100 cases. This is the end of a long series, and the author selects from many observations the following: (1) Frequency, 0.018%; (2) Average age, 49.4 years (one case aged 90 years, another aged 9 years); (3), Sex, the same; (4) No difference between right and left eye; (5) The tumors are usually spindle cells, leucosarcoma. The round cell form is seldom seen; (6) Pigmented and leucosarcoma shade gradually into each other; (7) The flat form of sarcoma may extend outside the globe by blood vessel extension; (8) Peripheral sarcoma may extend along the optic nerve and also the blood vessels, so the prognosis is worse; (9) Pigmented sarcoma appears more in the posterior portion; leucosarcoma the anterior; (10) The upper and the under portions of the globe are more affected; (11) phthisis bulbi may come on thru infection of the necrotic area, and more often occurs in the round-celled form.

By means of the ophthalmoscope, and the supporting evidence **Castresana** states that a diagnosis of sarcoma of the choroid can be made. The haze, the luminous sensation, scotoma, with diminution of the field, increased tension and metamorphosis, when the tumor is situated at the macula, form a clinical picture sufficient for an early diagnosis. Three cases are reported in which many of these symptoms were present.

**Alt** observed an unusual type of intraocular *angiosarcoma*. Microscopic examination of the cornea showed a great many more cells in the parenchyma than normal, especially in the periphery. The ciliary body was greatly atrophied. The patient gave a history of the eye becoming suddenly blind and

painful; this was later corrected in that the sight had gradually failed during the previous four or five months. At the time of observation, acute glaucoma, +3 tension, and the uncommon experience of exophthalmos were present. Later the inflammatory symptoms subsided and the tension became —1. There was nothing in the histologic findings to explain the rapid increase of glaucoma, combined with the marked exophthalmos, after the instillation of a few drops of eserine. Neither is there any explanation of the lowering of the tension, as we must assume the intraocular tumor was still growing within the eye.

A round-celled leucosarcoma of the choroid, in a man aged 52 years, is reported by **Shumway**. The first microscopic sections showed an isolated round nodule, lying between the thickened detached retina, and the lens, and composed of nonpigmented round cells, of the same size as the nuclear cells of the retina. There was necrosis of a considerable part of the tumor, leaving well staining mantles of cells surrounding the blood vessels, as in glioma; and the growth had the appearance of having sprung from the retina. Further sections of the other half of the eyeball, however, showed the tumor to have sprung from the choroid.

A case of sarcoma of the choroid, with certain striking features, by **Jackson** and **Finnoff**, is of especial interest. Over fourteen years elapsed from the time sight was noticeably impaired, and two and one-half years after glaucomatous symptoms had arisen, until the eye was enucleated. Microscopic examination demonstrated a spindle-celled melanosaarcoma of the choroid, with metastases thru the globe into the conjunctival and orbital tissues. There was a mild panophthalmitis with a peripheral annular infiltrate of the cornea without perforation of the globe. The course of these protracted cases indicates that within the eye, influences are exerted which may retard or wholly check the development of such growths. One of these is probably the influence on cell life of intraocular pressure. The effect of abnormally high in-



raocular pressure is fairly well known thru the changes produced in previously normal tissues by glaucoma. It is rather probable that the normal intraocular pressure exerts some such influence unfavorable to cell life of a new growth. A good review of the literature on this type of case is given.

**McGuire** found of all malignant neoplasms, sarcoma to be the chief intraocular growth of adult life. Of all pathologic conditions of the eye, it occurs in only from .03% to .06% of cases. The writer reports three very instructive case histories. The first patient presented typical symptoms of acute inflammatory glaucoma in one eye, and in its fellow a deep cupping of the nerve was observed. Microscopic findings in the inflamed eye showed a spindlecell sarcoma.

The second patient gave a history of having been kicked by a horse, above the right temple, some years previous. There was a small corneal opacity. The retina was detached, no pain or vision. Six weeks later slight pain was felt, and by oblique illumination, fairly accurate outlines of an intraocular growth were made out. The microscope indicated a melanotic sarcoma.

The third patient, a man, aged 48 years, had previously lost his right eye as the result of a specific iridocyclitis. The left eye showed thru a dilated pupil, a large reddish brown mass. A diagnosis of malignant growth was made. Enucleation and microscopic examination showed a melanotic sarcoma. The patient was still alive eighteen months later.

In a resumé regarding certain features of intraocular tumors, **Harbridge** reports of a man, aged 50 years, with a growth within the globe, who totally lost his vision in the right eye, two months previous to observation. No pain, redness or unusual appearance was complained of; the pupil was enlarged Tn. + 1. By oblique illumination a mass could easily be seen at the nasal side behind the plane of the lens. A very excellent microscopic report by **Lincoff** showed the growth to be a small spindlecell melanotic sarcoma,

arising from the lamina fusca choroidea. A 7 mm. section of the optic nerve, which was obtained, showed no invasion. At the age of 61 years, eleven years after the enucleation, the patient was well and showed no secondary involvement.

**De Schweinitz** and **How** have detailed the case history of a *melanosarcoma* arising from the vascular layer of the choroid posterior to the base of the ciliary body. The growth was observed, by oblique illumination, as a chocolate brown mass. The woman, aged 40 years, gave a negative history. The tumor was sharply circumscribed and noninfiltrating; sections were very hard.

**Moore** refers to his previously reported four cases of *melanomata*. His recently reported patient was a man, aged 53 years. The general appearance was very similar to that of his former cases. There was no irregularity of pigmentation nor stippling of the tumor; the edges were slightly feathered, and not hard or sharp. The sectioned eye showed a mass 1.9 mm. in diameter, 4 mm. in thickness. It appeared to be formed in the more superficial layers of the choroid and composed of very broadly, spindle-shaped cells with pigment scattered unevenly thruout the growth. These tumors are of uncommon occurrence, and usually discovered by accident during routine ophthalmoscopic examination.

Five weeks following a fundus examination, in which the appearances seemed normal, **Clapp's** patient returned with a marked failure of vision. At this time, detachment of the retina was observed. Transillumination showed no dullness. About eleven months later, secondary glaucoma developing, the eye was removed. Three months later the patient died with metastasis of the liver. Microscopic examination showed melanosarcoma of the choroid. It is most probable that the failure of transillumination was due to the light not getting far enough back. Attention is called to the value of making a small conjunctival opening and carrying the light backward toward the optic nerve. **Desogus** and



also **Fagin** each report cases of melanotic sarcoma.

**De Salterain** found upon examination of the literature on sarcoma of the choroid but thirteen or fourteen reported cases in children. One of his patients was a girl, aged six months, the other a boy aged 22 months. Prompt enucleation was done with no recurrence during the interval of the time of reporting, four and eight months.

**Church** discusses the clinical symptoms of sarcoma of the choroid. His first patient showed no evidence of metastasis in four years; the second patient did not submit to operation until four years after first being observed, at which time the sclera had become sacculated. **Fraxanet** and also **Berg** each report on cases of choroidal sarcoma. **Hughes** presented a patient in whom a diagnosis of sarcoma of the choroid was made. Section of the enucleated eye two months later showed no microscopic evidence of the growth.

**Rumsey's** experience with five cases of tumor of the eye is impressive of the importance of an early diagnosis, because of the light they are apt to throw on obscure parts of general pathology. Prompt enucleation often affords a very favorable prognosis. His first patient was a child, aged four years, with endophytum *glioma*. Enucleation of the eye showed no recurrence. The second patient, a woman aged 45 years, had a sarcoma of the choroid of a hematogenous pigmented type; no recurrence. A round and spindle-celled sarcoma of the posterior pole was observed in a man, aged 34 years. The growth followed some time after a head injury. At first a diagnosis of detached retina was made. The fourth case, a suspected melanotic sarcoma, covering a third of the cornea. Microscopic examination showed it to be an epithelioma; no recurrence. The fifth case was an extensive growth of the lower lid, lacrimal sac and part of the upper lid, in a man, aged 67 years. The eyeball, together with lids and sac, were removed. Microphotographic reproductions illustrate the paper.

Malignant growths of the eye is the subject of a communication by **Allen**. **Shisoi's** observations are on *metastatic carcinoma* of the choroid. Benign growth of the choroid is the subject of a paper contributed by **Opin**.

**Adams** reports the autopsy findings in which microscopic sections of the lung and liver tissue revealed melanotic sarcoma. The patient, a female aged 30 years, gave a history of having trouble with the right eye four years previous. Two years after this the organ was removed, presumably for an intraocular growth in the second stage. No microscopic examination was made at that time, but it is believed to have been the primary focus. **Wheeler's** patient, aged 40 years, showed an intraocular growth with a Wassermann +4. Specific medication was continued to the point of tolerance, but vision failed slightly.

**Heed** presented a boy, aged 15 years, exhibiting a subretinal mass in the temporal field of the right eye. He found an area of choroiditic atrophy, encroaching upon the macula; and, in juxtaposition to the lower border, there was a greyish circumscribed area protruding at least three diopters in advance of the retinal plane. Wassermann and von Pirquet reactions were negative. There has been no change in two years. A definite diagnosis has been deferred. An organized exudate resulting from the choroiditis had been considered.

**TUMORS OF THE RETINA.**—In the left eye of a female patient, aged 64 years, **Hird** found extensive ophthalmoscopic changes, especially in the macular region; V., hand movements; no rise in tension. Under the impression that he had to deal with a new growth, and after consultation, the eye was removed. The opinion was expressed by a pathologist that "it was a form of malignant growth springing from the retinal pigment cells rather of a sarcomatous nature." A subcommittee of the Ophthalmological Society, however, after examining sections, reported that "the case belongs to the type which was described by the late Mr.

George Coats as a form of retinal disease with massive exudation."

As far as **Griffith** was able to make out, he found six cases of *hereditary glioma* on record, which, with his own two cases, brings the total to eight. In a family of six children, four had double glioma, the mother having lost one eye in infancy, from the same cause. The two who escaped were bottlefed. Whether one can ascribe this immunity to this fact is not known. In the second family, of three children, one had bilateral, and two unilateral glioma. The mother lost one eye in infancy, from the same cause. Clegg is inclined not to place too much importance on the transmission from the mother. He believes this impression has been formed largely for the reason that it is usually the mother who brings the child, and the surgeon notes whether or not she has lost an eye.

**O'Connor** makes a most excellent contribution, together with illustrations, and a very complete list of references on *glioma retinae*. Interest in the case history cited centers in making a diagnosis, owing to the marked symptoms; and also whether the phthisis bulbi, or the glioma, was the primary condition. Previous history of the case was vague and uncertain. A female, aged nine months, shortly after birth had a "blood-shot" eye, with a slight discharge. At the time of coming under observation, the globe was shrunken and irritable; rather later, its fellow became irritable, and under the impression that it was a case of sympathetic ophthalmia, the phthisical globe was removed. Pathologic diagnosis by Verhoeff was glioma retinae and atrophie bulbi. Subsequently the remaining eye developed all the clinical evidences of glioma. This eye was removed, followed two months later by death due to sepsis and exhaustion. The paper is well worth consulting by one interested.

Three weeks after a trauma of the left eye, in a child aged 8 years, **Ring** made a diagnosis of retinal *neuroepithelioma*. Upon the suggestion of an immediate enucleation the patient disappeared, and was not seen again for nine months, at which time the eye was re-

moved. Three months later there was a recurrence in the orbit, two-thirds the size of a baseball. The mass was removed by Clark's method of electrothermic surgery. Subsequently the child died, showing evidence of metastases. The report contains a good review of the literature.

In **Taylor and Fleming's** case of *bilateral glioma*, in a female child, aged 3 years, there was orbital recurrence followed by multiple metastases. In the same report Lawson read notes concerning a recurrent case in a boy aged 3½ years. Reference is made to all reported cases or metastases. **Knapp** presented the photograph of a case of bilateral glioma in a child, aged 2 years. The appearance was that of a fungus hematomas. The extension of glioma, if left to itself, is to proceed back, enlarging the optic sheath, which it then perforates. The minute the growth gains the loose tissue of the orbit, its progress is remarkably rapid.

In **Hugger and Forman's** case of so-called glioma of the retina, the group term *neuroblastoma* is used. There is present in the sectioned eye four whitish nodules. So completely does the tumor line the vitreous cavity that it is not possible to identify the retina at all. At the posterior portion of the tumor, cells have invaded the choroid and sclera. Pathologic notes and illustrations accompany the report. Both **Leal** and **Haas** have contributed to the subject of glioma.

**TUMORS OF THE OPTIC NERVE AND SHEATH.** — Photographs illustrate the good cosmetic effects obtained by **Bane** in his patient with *cyst of the dural sheath* of the optic nerve. A lad, aged 6 years, at the time of his first visit showed vision with the left eye almost nil a pearly white disc and a hyperopia of 3 D. Two and a half years later the eye ball protruded 5 mm. forward, downward and inward. The hyperopia had increased to 6 D. A tentative diagnosis of fibroma was made. The X-ray did not reveal any evidence of sinus involvement or solid tumor. The mass, together with a section of the optic nerve, was removed through a conjunctival incision 30 mm. long and 5 mm. external



to the cornea. During the operation the cyst collapsed, permitting the escape of a clear fluid. Finnoff's pathologic findings showed the optic nerve fibers atrophic; the pial sheath of a honeycombed appearance; and the dural sheath, greatly thickened; the endothelium in the anterior portion filling the space between the pia and dura. Posteriorly, the cells gradually thinned.

**Eleonskaia** reports the case of a tumor of the optic nerve in a boy, aged 6 years, of three years duration, apparently of benign character, in which all the topographic relations of the nerve are preserved, but considerably increased in their dimensions. There was a polymorphic character in the microscopic structure, and in the central parts, corresponding to the nerve trunk, a resemblance similar to *glioma* and *gliosarcoma*. There was also some degeneration and edema of tissue.

**Cecchetto** describes an ingenious new method of operation for the removal of a retrobulbar fibroma. **Shiosi** used the Krönlein operation for the removal of a tumor which proved to be a *lymphoendothelioma*. The growth had its origin from the posterior portion of the sclera, causing a kink in the optic nerve.

A *psammoma* of the sheath of the optic nerve was observed by **Ferro**. In **Shiosi's** two cases of intradural tumor of the optic nerve, histologically, one was a *glioma* while the other was a *myxoma*.

**Mansilla's** patient with *sarcoma* of the right optic nerve was a woman, aged 63 years. Exophthalmos, immobility of the eye and optic neuritis were present. The tumor, which was situated in the posterior part of the orbit, was adherent to the eye ball and optic nerve. The entire orbital contents were removed. Microscopically the growth was a fibrosarcoma. The descriptive pathology of a necrotic tumor of the sclerotic is contributed by **Alt**. **Edmondson** reports a lipoma of the optic nerve successfully removed by the Krönlein operation.

**TUMORS OF THE ORBIT.**—A clinical diagnosis of sarcoma of the orbit was made in **Wible's** patient. The dura-

tion of the growth was about two years. Following exenteration, the pathologic report of the specimen was *rhabdomyoma*. Few cases of this rare growth have been reported in literature.

The cosmetic results were almost perfect in the patient **Posey** exhibited, from whom he had removed an *adenoma* of the orbit. **Wright** reports a rare growth observed in a female, aged 58 years. Six years previous, she was operated upon for a femoral hernia, which may have been an ovariectomy. During a period of some twenty months the patient suffered attacks of pain in the left eye, followed by perceptible loss of vision. The eye was enucleated for chronic glaucoma. About six months later, a secondary mass was removed from the orbit. Microscopic examination showed the presence of a *malignant papillary cyst adenoma*. The walls of the eyeball were involved. Tumors of this type are usually found in ovaries, breast and intestinal tract, and never as a primary growth, at least, about the orbits.

**Coover** presented a patient, aged 11 years, from whom he had removed a *fibroma* of the orbit. The mass, 25 x 35 mm., was adherent to the foramen and optic nerve on the temporal side. In its removal the optic nerve was injured, necessitating enucleation of the globe. **Sander's** patient proved to have a tubercular tumor of the orbit.

**Griffith** exhibited a patient, a female, aged 33 years, with proptosis of the left eye, movements free in all directions. A distinct new growth was palpable, at the back of the eye. There was no light perception or pupil reaction; nevertheless, the optic disc was of good color and the vessels were full. **Calderaro** did an excision of a tumor of the orbit, without appreciable cicatrix and without enucleation of the globe. **Jansson's** patient has bilateral exophthalmos, due to tumor of the orbit.

**Cirincione** contributes the history and operative procedure in three cases of endorbital *osteoma*. In the first two patients, the mass occupied the upper inner part of the orbit. One occurred



in a man aged 25 years; the other in a girl, aged 16 years. The third patient was a man 21 years old, in which the mass occupied the whole orbit, pushing the eyeball forward so that the posterior pole was on a plane with the margin of the orbit. The operation consisted of practically excavating a new orbital cavity. The growths were from three to five years' duration.

In **Blanco's** case of *osseous tumor* of the upper part of the orbit, the eye deviated down and out. Removal of the mass was accomplished without any damage to the eye. **Stern's** patient had an osteoma. **Posey** exhibited a patient, a male, aged 19 years, with an orbital growth, possibly an osteoma. The mass was hard and bosselated, confluent with the supraorbital rim and merged with the inner wall of the orbit. The growth was first observed eight or nine years previous. Vision equalled 5/10. The mass was to be extirpated thru a large incision under the brow.

**Hupp's** case of *exostosis* of the orbit occurred in a man aged 26 years, who gave a negative family and personal history. Fifteen years ago, without apparent cause, there was noticed a small hard lump within the right orbit, on the nasal side. While for years this bony growth remained quiescent, a few months before examination, blurring of vision, diplopia and pain became manifest. A hard, rounded, bony tumor, the size of an English walnut, protruded from the nasal side well beyond the orbital margin. The tumor was removed and proved to be attached to the orbital plate of the ethmoid.

**Kalt's** case of multiple *exostosis* occurred in a boy aged 13 years. His personal history was negative, but the mother gave a history of *exostosis* of the ramus of the lower jaw. One of the bony growths was situated at the inner orbital margin on the left side, pushing the globe backward and upward. The tumor, the size of a walnut was removed. Its attachment was near the junction of the os planum of the ethmoid and the lacrimal bone. Similar *exostoses* were present on the left external nasal wall, the anterior lacrimal

crest, and the ascending apophysis of the superior maxillary bone.

An interesting experience is reported by **Chance**, in the removal of a *cavernous angioma* of the orbit. The patient was a female, aged 16 years, with a tumor first noticed soon after birth, which had gradually increased in size until it occupied the upper half of the left orbit. The mass extended from the upper margin of the internal rectus across the globe to the external rectus and backward indefinitely. The mass was accommodated by an absence of the middle third of the orbital ridge and roof, together with a fenestrum in the external orbital wall. Dissection of the mass was most tedious. The base rested on the upper outer aspect of the globe and was quite adherent to the sclera. Histologic study showed no capillaries or glandular elements, no cysts or signs of degeneration.

**Boot** observed a female, aged 21 years, with an angioma of the orbit. The first evidence of the trouble began about nine months previous. Of late the mass has markedly increased in size. There is a soft swelling at the inner part of the orbit; the upper eyelid is swollen. There is a distinct thrill felt and bruit heard. The growth does not extend into the nose. X-ray pictures show no evidence of erosion. The reporter discusses the various types of this class of tumor, their infrequency and possible appropriate methods of treatment.

An unusual orbital tumor was removed by **Wheeler** by the Krönlein method. A female, aged 40 years, gave a history dating back ten years, at which time she observed a small red spot in the right eye. At the time of examination, there was a large subconjunctival hemorrhage and a decided protrusion in the region of the lacrimal gland. Operation revealed a jellylike mass adherent to the lacrimal gland and outside the muscle cone. A small area of the upper part of the temporal wall of the orbit was deficient. Dixon considered this to be a hemorrhagic form of degenerating connective tissue tumor; Weeks, probably sarcoma;

Verhoeff, an unusual form of hemangioendothelioma. **Satake** also observed a hemangioendothelioma of the orbit.

Primary *sarcoma* of the orbit with anterior adhesive iridocyclitis is reported by **Ischreyt**. Exenteration revealed a necrotic sarcoma with a large cyst. In the enucleated eye, there was a close attachment of the root of the iris to the cornea and sclera. In spite of this fact, the tension was not increased but diminished. In **Posey's** patient with sarcoma of the orbit, the eye had been enucleated elsewhere four years previously, perhaps for sarcoma of the choroid. The recurrence in the orbit was a firm black mass occupying the position of the eyeball. Exenteration was followed by marked hemorrhage, which ceased upon the application of the Clark method of desiccation. **Zentmayer** observed a growth in the orbital fold of the left eye. The mass, 40x25 mm., extending from midline to the external canthus; it being encapsulated, was easily removed thru an incision. Microscopic examination showed a predominance of large round sarcoma cells.

**Darier** reports a case of melanosarcoma of the orbit which began as a small conjunctival speck. Ophthalmoscopically pigmented points in the retina, which had been noted, were found to be connected with the mass by means of vascular filaments. Thirteen months after exenteration there had been no recurrence. **Curry's** patient had the same type of malignant growth, while, in **Krebs' patient**, the sclera was involved.

Symmetrical bilateral *endotheliomas* of sarcomatous type, of the orbits, were removed by **Kirkpatrick**. They occupied the site of the lower lids and extended well back into the orbits. There was no glandular involvement. When last seen, three months later, there was no recurrence.

**Posey** exhibited a patient, aged 67 years, upon whom he operated and also used a desiccation, for a very extensive *epithelioma* of the orbit. One year previous, the first operation, with a pedicled flap from the temple, was per-

formed. Four months following this, there was a recurrence. Preceding the last operation an overripe cataract was removed from the fellow eye. Present appearances are very satisfactory.

A tentative diagnosis of an ethmoid osteoma was made by **Sattler**, following an exploratory operation. A lad, aged 14 years, during the preceding two years, had noticed a prominence of the left eye. Two months prior to his first visit, the protrusion became more pronounced. Thru a Krönlein incision, a very thoro examination of all parts of the orbit was made. An extremely hard protrusion of inner and upper wall was discovered, and the globe was enucleated to permit an easier access to the region of the ethmoid or sphenoid bones. After careful consideration it was determined not to proceed with the removal of the small and probable osteoma, but await results of future observation.

**Zentmayer** exhibited from the service of Chance, a probable case of malignant growth of the antrum. The patient, a female aged 60 years, had a firm ridgelike mass palpable just within the inferior orbital margin. A thoro examination of the patient had not been completed.

TREATMENT OF TUMORS.—**Clark** reports the *electrothermic coagulation* technic, which he employed on **Ring's** patient with recurrent neuroepithelioma. The protruding portion of the growth was removed by means of the bipolar d'Arsonval current, applied by a chain snare which was gradually tightened. In the second stage of the procedure, the same current was applied by means of a short knitting needle. The growth in the orbit was curretted away after coagulation by the current.

**Ring** exhibited a male patient, aged 65 years, from whose lower right lid he had removed, by surgical means, fifteen years previous, an extensive epithelioma. The denuded area was covered by epithelial grafts from the forearm. The lids remained normal until two months ago. The cicatricial ectropion now present is the outcome of a plaster treatment which had been applied to an epitheliomatous splotch on



the cheek; X-ray and radium having failed. Ring's purpose in presenting the case is not to advocate the use of plasters, notwithstanding its merit in this case, but to emphasize the fact that prompt, definite and more satisfactory results can be accomplished by the application of electrothermic desiccation, as carried out by Clark.

Massey has obtained very satisfactory results in the treatment of epitheliomas of the lids. For smaller growths, zinc ionization by the uni-polar method is well adapted; while in the more extensive invasions the bi-polar is quicker and more effective. The histories of twelve operable, and six inoperable cases are given.

## INJURIES.

THEODORE B. SCHNEIDEMAN, M. D., F. A. C. S.

PHILADELPHIA, PA.

This section reviews the literature of its subject from January, 1917, to July, 1918. The late results of injuries are often noticed in the sections referring to the various portions of the eye and its adnexae, which are involved.

**INJURIES FROM HEAT.**—In Ramsey's case of burn of both lids, the upper had been completely destroyed and there was marked ectropion of the lower. There was a small corneal opacity at the lower margin, probably resulting from a traumatic ulcer. Marked purulent conjunctivitis was also present. The treatment of a case like this is perplexing. A case of burn of the cornea from exposure to the heat of an electric arc is reported by Osborne. Two gray lines of coagulated corneal epithelium corresponded to the edges of the partially closed lids. These disappeared in twenty-four hours. Denig has reported a large number of cases of burn treated by transplantation of mucous membrane from the mouth.

**INJURY FROM ELECTRICITY.**—Mikami observed an extensive burn of the entire face from an electric current of 38,000 volts, resulting in complete bilateral ectropion. This was perfectly remedied by a large transplantation of skin without a pedicle. Burge has repeated his conclusions with regard to the influence of *ultraviolet* radiations in causing cataract. (See p. 88.)

**CHEMICAL INJURIES, GASSING.**—Gremaux, of the French Army, comes to the following conclusions: The lacrimatory gases employed to date by the Germans cause more or less violent conjunctival reaction, accompanied by

exfoliation of the tissue of the limbus. The lesions rapidly attain their maximum, and under early treatment remain quite limited and progress towards cure under appropriate management. Length of exposure to the gases appears without influence, either as regards intensity of the symptoms or their ultimate course. The treatment of these cases is as follows: No occlusive bandage; mild lotions; pupil to be kept dilated, watching the tension; every second day 1% zinc sulphate; potato starch poultices in frequency according to the intensity of the hyperemia; a "floating" bandage to protect from light while leaving the eye uncovered. No cocaine, as the epithelium has already been rendered friable by the action of the gas.

Teulières and Valois report the effects of gas upon the apparatus of vision. The gas affects both the anterior and posterior segments of the eye and also the adnexae. The lid margins show burns aggravated by excessive flow of tears. The lids themselves are edematous; there is excessive lacrimation without other lesion. The conjunctiva is congested, most markedly near the limbus; slight chemosis. There is severe and protracted congestion of the iris but no posterior synechia; the color is less vivid than normal and has a flocculent appearance; the pupil re-



acts sluggishly to light and slowly to mydriasis. The media have not been found affected. A mild degree of neuroretinitis occurs in many cases; the retina in the neighborhood of the disc suffers a peculiar change, becoming slate colored, thought to be due to edema; the discoloration is not limited to the immediate neighborhood of the disc but extends along the larger vessels; the veins are dilated, often tortuous. The visual acuity is diminished. As regards etiology, the writers believe that the gases produce a severe reaction in the mucous membranes of the nasal cavities and accessory sinuses; and that by this path and the cribriform plate of the ethmoid, the meninges of the optic nerve may be directly affected. The prognosis is favorable. **Petit** describes two cases in which the eye and eyelids were seriously injured by some liquid caustic contained in a bursting shell, which he supposes to be analogous to phosphoric acid. In each case one cornea ruptured and enucleation was required. These are the only two similar cases observed by the reporter in a large experience.

In **Hansell's** case, following a splash of *chloroform* into each eye, both corneas became superficially infiltrated and part of the epithelium destroyed; the conjunctivas were intensely inflamed, resembling subacute trachoma; perfect and rapid recovery followed.

**Brav** reported the effects produced by accidental instillation in the conjunctiva of *corrosive sublimat*. **Oloff** has written on injuries to the eyes from ink and anilin.

**CONTUSIONS.**—In **Juler's** case, following a blow, 13 days after the injury, the lower retinal arteries and veins were seen to end some distance from the disc, their extremities being curved backwards upon themselves. There was hemorrhage around the disc which was pale and slightly depressed with ill defined lower edge, on the retina below and in the vitreous. The retina below the disc looked edematous and was somewhat raised down and out. No light perception; two weeks later, the hemorrhage had disappeared and a considerable formation of fibrous tis-

sue, extending from the disc into the retina, had taken place. No foreign body in the orbit nor fracture of its walls appeared upon the skiagraph.

**Monaghan** observed rupture of the sphincter of the iris, following a blow. There was iridodialysis at the lower nasal periphery, and a rupture of the choroid near the macula with hemorrhages and pigment. Vision was reduced to counting fingers at 3 feet. **Schwenk** referred to the case of an engineer who was struck in the right eye by an owl while driving his locomotive; the choroid was ruptured and central vision destroyed. A case of contusion of the eyeball resulting in annular opacity of the lens and a hole at the macula is reported by **Berrisford**.

**Parsons** calls attention to the frequency of ruptures of both choroid and retina in war injuries of the eye, as against the rarity of retinal rupture when the choroid is torn in civil life. Attention to this has been specially drawn by **Lagrange** in his recent work on "Fractures of the Orbit." When the choroid alone is ruptured, a scar composed of a quite limited amount of fibrous tissue is formed, with relatively little impairment of vision unless the immediate vicinity of the macula is involved. When, however, both choroid and retina are involved, very considerable masses of fibrous tissue are formed, often projecting into the vitreous, with processes resembling those of retinitis proliferans.

For the cause of these processes **Parsons** suggested an explanation some years ago. He thinks that this proliferation of fibrous tissue in the scars of retino-choroidal ruptures appears to be susceptible of a similar explanation.

In these cases there is considerable extravasation of blood from the choroid and retina into the vitreous. In the ordinary vitreous hemorrhage due to rupture of retinal vessels there is little mesoblastic tissue in contact with the blood capable of providing fibroblasts to bring about organization of the clot, the vitreous being itself inert. When both choroid and retina are ruptured, the mesoblastic choroid offers an ample supply of active fibroblasts and the

clot organizes into a mass of fibrous tissue exactly as in hemorrhage into the other connective tissues. If this explanation is correct, it furnishes an argument against the method of removing foreign bodies from the vitreous by introducing the pole of the small magnet thru an incision which perforates sclerotic, choroid and retina; which procedure would further the risk of detachment of the retina, etc., from contraction of bands of scar tissue formed as above. No such objection holds against the plan of drawing the body into the anterior chamber with the giant magnet, preparatory to its removal from the eye.

**Leplat** saw a man who had been looking at a mortar, one meter or more away when an explosion occurred. He exhibited blood in the anterior chamber, ciliary hyperemia, impaired vision, and a pupil that dilated unequally under atropin, but at the end of sixteen days the eye became normal.

In **Shumway's** case contusion of the eye caused rupture, extending across the optic disc. There was no wound of the eyelids nor eyeball but hemorrhage into the anterior chamber and vitreous obscured the iris and fundus. Vision was reduced to perception of hand movements on the temporal side below. Later an iridodialysis was found at the lower border of the iris; and when the vitreous cleared up, in the course of four months, a tear was discovered extending across the lower third of the optic nerve. At this point there was a depression, over which ran a band of newly formed connective tissue. The retinal blood vessels were interrupted at the disc margin and there was a broad area of atrophy of the choroid bordering the tear, and much superficial disturbance of the retina beyond.

The reporter observed that there are only three cases on record, where a tear across the nerve has occurred from contusion without penetration, the usual rupture being in the choroid. In every case the tear had been at the lower border of the nerve, and he thought that the blow produces sudden violent rotation upward of the eye-

ball and thus causes a separation of the nerve from its scleral attachment.

**Whiting** classifies concussion changes of the lens according to position and shape of the lens *opacity* as follows: 1, posterior cortical (a) stellate; (b) irregular, probably arrested development of a stellate opacity. 2, anterior cortical, (or subcapsular) (a) annular, (b) disco-annular, (c) discoid, (d) double discoid, (e) stellate, (f) irregular. He describes each of these varieties somewhat at length and relates a series of cases, 32 in number, including examples of all the above varieties. His discussion relates to the nature of the injury and the various changes that occurred during observation, etc.

**Harriet** observed unilateral posterior polar cataract following the explosion of a shell, a few meters away from two soldiers who were near each other at the time. Nine days later there was no sign of wound of the eyeball in either case. In one there was a small superficial scar at the lower border of the orbit near the nose. In each case there was persistent mydriasis, and a stellate opacity at the posterior pole of the lens; which latter became opaque thruout, in both patients. Harriet considers the cataracts to have been caused by the impact of aerial waves from the shock of the explosion. **Lawford**, commenting upon these cases considers that, in the absence of all evidence as to the conditions present immediately, or shortly after the injury, it is difficult to accept this view of the etiology as the most probable.

**Frenkel** thinks that traumatic subluxation of the lens is much more common than is generally supposed. He groups cases under two headings: (a) typical, diagnosis certain; (b) atypical cases, difficult to diagnose and in which the following are the most valuable signs: (1) Existence of a fold in the iris concentric with the circulus major and limited to a portion of the circumference, shown by a single (sometimes double) line, produced by the close apposition of the iris to the edge of the subluxated lens; (2) diminution of the pupillary reflexes, and partial mydriasis; (3) unilateral corectopia; (4) mi-



nute tears in the iris, near the root, or in the sphincter area; (5) retroversion of the iris at the free edge of an iridodialysis; (6) partial traumatic cataract; (7) acquired myopia or hypermetropia. Three varieties are described; (a) with rotation of the lens on an equatorial axis; (b) with displacement of the lens backwards; (c) with displacement forwards: the latter is that most frequently overlooked. The proportion of cases of subluxation at the Ophthalmic Center of Toulouse was, in 1915, 2 per cent in a total of 547; in 1916, 7 per cent in a total of 518.

**Black** reports conjunctival hemorrhage in one eye following a railroad injury. Both eyes were highly hyperopic with astigmatism; vision in each eye equalled 20/40 with correcting lenses—a result which seemed disappointing as a medico-legal case was impending.

**Terrien** thinks his case of *manifest* astigmatism following contusion of the eye, to be unique. A nurse after contusion of one eye had a visual acuity of 2/10, (the vision had been full before the accident), while that of the other was normal. Ophthalmometric measurements showed corneal astigmatism of 3 D. with the rule right and left. The shadow test gave 3 D. of myopic astigmatism with the rule for the injured eye, and emmetropia for the other. A —2.50 cylinder, axis horizontal, raised the vision from 2/10 to 9/10; the same cylinder lowered the visual acuity of the normal eye.

It might be concluded that the diminution of the acuity was due to suppression of the natural correction of the astigmatism by the ciliary muscle. But the writer holds that the astigmatism was the consequence of a traumatic spasm of the accommodation as a whole, in support of which he cites the contraction and rigidity of the sphincter pupillae, as well as the narrowing of the range of accommodation (between 10 cm. and 20 cm.); and finally some amelioration of the acuity after atropin. He draws the conclusion, which will hardly be admitted by oculists generally in this country that

the total corneal astigmatism should never be entirely corrected so long as the accommodation is sufficient to compensate the same, and that the strength of the correcting cylinder should only be increased in proportion as presbyopia advances, so that the youthful eye may be encouraged to correct any astigmatism present in whole or in part by the action of its ciliary muscle.

In **Miller's** first case, a boy aged 9 received a kick over the right eye which dazed but did not produce unconsciousness; he walked to his home. Three days later he was admitted to the hospital. The right upper and lower eyelids were seen to be markedly swollen and dark colored from effusion of blood. There was a small laceration of the upper lid at the inner canthus where the upper was torn from its attachment. The eyeball itself seemed uninjured and the patient was able to see quite well with it; although it seemed rather proptosed and fixed, with movements very limited in all directions. Both pupils were dilated, equal though sluggish in their reaction to light. The boy did not complain of pain in the eye and there was no subconjunctival hemorrhage.

In the evening of the same day he became rapidly worse and died 8 hours after admission. The autopsy showed a fracture of the os planum of the ethmoid on the right side, and also a fracture of the cribriform plate of that bone. In addition there was an abscess in the early stages of formation affecting the anterior inferior surfaces of the frontal lobes of the cerebrum. Some dirt had evidently been conveyed to the seat of the fracture, giving rise to the acute infection and rapidly fatal termination.

In a second case a child of six had been struck in the eye with a stick. On the following day the eyelids were slightly swollen. Upon separating the lids under a general anesthetic, all that could be made out was a wound or tear in the upper part of the plica semilunaris. Three days later the lids were much more swollen and there appeared to be definite orbital cellulitis. While preparing to make an incision into the



orbit, convulsion occurred, temperature 106.6, pulse uncountable, Cheyne-Stokes breathing, small hemorrhage from both nostrils. In fact she had an attack like the previous case but recovered. The following day a free incision into the orbit evacuated a quantity of pus. The child was better after this but lost the power of speech and the left arm was paralyzed. Trephining over the right Rolandic area failed to find pus. Three weeks later upon reopening the wound a large quantity of pus squirted up out of the brain substance, but the tract from which it came could not be determined. There was great improvement for a time. A month later, a large hernia cerebri developed; she lost flesh and power in both left arm and leg. An unsatisfactory effort to deal with the hernia was made by turning back the skin flap and abscising a portion of the brain tissue. Death at the end of 2 months. The autopsy showed extensive abscess of the frontal lobe of the right side, with patches of meningitis on the dura; no signs of fracture. The writer concludes that these two cases point to the necessity of making free incisions into the orbit early, where cellulitis is suspected, and of not waiting for "pointing" and a feeling of fluctuation. Further, if the skull is opened, an attempt should be made to open as near the site of the injury as possible.

In **Hansell's** first case, the patient was blown out of a room by an explosion in a powder mill; several fellow workmen were killed. The patient believed that his eyes were blown out; they were found to be absolutely uninjured, nor was there any serious lesion elsewhere. In a second case an eye had been struck with a forcibly thrown wad of paper. A few days later vision declined without pain or signs of inflammation. The ophthalmoscope showed a patch of retino-choroiditis with vitreous opacities; both conditions improved under active diaphoresis.

**Krückmann** writes upon simultaneous injuries of the eyes and antral cavities. In fractures of the upper jaw and of the orbit, a bone fracture occasionally extends into the posterior wall of the

frontal sinus. Even when the mucosa remains intact, subsequent operative procedures in the frontal sinus may lead to opening of the small scar with consequent meningitis. Occurring secondarily in inflammatory conditions of the frontal sinus such injuries should be treated as conservatively as possible during the first three months. It is to be hoped that recent roentgenographic procedures will render possible the recognition of such delicate fractures.

**Marin** reports a case of a woman aged 75, who received a blow upon the inner side of the left orbit two days before examination. The blow was followed by violent pain in the eye and immediate loss of vision. At the examination the lids were edematous and the conjunctiva chemotic; there was moderate hyphema, the pupil was contracted, the iris intact, the fundus inexplorable on account of hemorrhage into the vitreous, the tension diminished, vision equalled light perception with good projection; the eyeball was tender to pressure in the ciliary region. There was a linear wound of the sclerotic in the upper outer quadrant, the borders of which were slightly separated by choroidal tissue. The wound was covered thruout by the bulbar conjunctiva, which did not show the slightest solution of continuity. There was a roundish swelling beneath the outer portion of the ocular conjunctiva about equal in diameter to that of the cornea, at a considerable distance from the scleral wound, due to the presence of the crystalline lens beneath the conjunctiva. The lens was removed after cicatrization of the scleral wound. A case of corneoscleral rupture of the eyeball with prolapse of the crystalline lens is reported by **Glagoleff**.

**PENETRATING WOUNDS OF EYEBALL.**—In **Black's** case the cornea was split from the nasal limbus to the center with iris entangled in the wound, by a flying piece of glass; the lens appeared clear and the conditions seemed favorable. Two days later a picture of extensive deep infection was presented; the wound was clean, the anterior chamber reformed and half full of yellow pus. Cyanid of mercury was in-

jected subconjunctivally, causing a most violent reaction; but the progress of the infection was at once arrested; slow resolution left the iris adherent to the lens, which was partly opaque, the coloboma filled with exudate and the tension raised to 60 mm. mercury.

**Sattler** reports a case of fatal tetanus following a lacerated wound of the eyeball, made by an arrow shaped from a bit of horseweed. When seen thirteen hours afterwards there was evidence of very serious reaction, and the eyeball was enucleated that day. The case did very well until the afternoon of the third day when symptoms of tetanus appeared. In spite of large doses of antitetanic serum, intravenously and intraspinally, the patient died seven days after admission.

**Boehm** discusses penetrating injuries of the eyeball by fragments of lead. Such injuries occur in war when, as described by Handmann, the rifle ball strikes steel buckles, or stone in the wall of the trenches, or when it passes through sand. The aluminum covering of the ball breaks, the lead nucleus is melted and pulverized into particles of varying sizes, from a seed grain to a cloud of lead in a state of minute subdivision. The reporter has seen many such cases. The Roentgen rays render a great service in the detection of such foreign bodies especially with the aid of the diapositive of Wesely.

In five enucleated eyes it was possible to demonstrate positively that the fragments were lead. The microscopic and macroscopic appearances of these eyes are minutely described. Different interesting cases are related showing that the injuries produced by the passage of lead to the fundus remained aseptic. They also prove that fragments of lead, if introduced aseptically into the eye, behave more favorably toward the tissues than other metals; lead is doubtless but little soluble in the vitreous. The prognosis is good even as concerns sympathetic ophthalmia.

**Edwards** presents a paper upon penetrating and nonpenetrating injuries of the eye based upon a large personal material. In over four years he has

seen but one case of sympathetic ophthalmia, having observed and treated 1,700 injuries of the eye in the past 12 months. The greater number of these were of minor importance, tho there were 23 cases of panophthalmitis, in which number but 5 enucleations were performed. After inflammation has subsided, 3 cases retained 20/30 vision in the injured and 20/20 in the uninjured eye. The others have vision ranging from 20/40 to 20/100 except one case still under treatment, in which a promising result may be expected. The writer insists upon the necessity of rigid asepsis in the treatment of foreign bodies of the cornea and the desirability of keeping such cases under observation for 24 or 48 hours after the injury. He details several instances of perforating wounds, in all but one of which the results were most satisfactory. He insists that the aseptic technique of all operative interferences upon the eye should receive as much consideration as in opening the abdominal cavity.

**Löwenstein** notes that in mountain warfare wounds from pieces of stone are very frequent. The resulting corneal infection may be treated with tincture of iodine. Small intraocular fragments are often well borne. In wounds of the globe Kuhnt's conjunctival covering is to be recommended. In warfare upon plains and wooded hills, ocular wounds constitute 2 per cent of the total of all wounds, (Servia and the Carpathians). In mountain warfare they constitute 8 per cent (12 months in the Alps). Of 98 perforating wounds 78 were due to fragments of stone; in 35 cases both eyes were injured. Metallic fragments were as often magnetic as nonmagnetic.

These ocular lesions were very frequently accompanied by injuries to the cranium. Injuries to the face usually suppurate rendering aseptic operations upon the eye impossible. The diagnosis between confusion and perforation was very frequently difficult, the perforation being very small in some cases and the anterior chamber filled with blood. Fragments of stone are well supported by the tissues of the



eye. Of 21 wounds of the crystalline lens, in 17 the deeper structures became involved, and finally the eyeball as a whole. In 4 cases the opacity began in the anterior cortex and remained localized there. Of 133 perforations, in 17 only was the sightless eyeball removed. So far as Löwenstein was able to follow the wounded under his care, he has not observed a single instance of sympathetic ophthalmia; he accordingly recommends conservative treatment in wounds of the eyeball received in mountain warfare.

In Halliday's case the tendon of an *inferior rectus* was torn across by a piece of hanging wire. When examined upon the following day, the eye could not be turned down. Below there was nearly half an inch of the tendon of the *inferior rectus* still attached to the eyeball, the free edge lying upon the cheek. The severed tendon was united by catgut sutures with an excellent result.

In Krauss's case a red hot piece of steel about 2 inches long and the thickness of a narrow lead pencil, penetrated the tissues just beyond the outer canthus, passing thru the ciliary region, then apparently between the posterior capsule of the lens and the limiting membrane of the vitreous, to the opposite side of the lens; the patient at once pulled out the hot foreign body, burning his fingers. Perfect recovery took place with 5/9 vision at the end of four weeks. There was a large scar beyond the outer canthus, two triangular discolorations over the ciliary body and a brownish rust colored translucent discoloration across the entire lower fifth of the lens, and a second discoloration in the outer third of the lens. The rest of the lens and vitreous were clear and the eye quiet. The X-ray was negative.

Stilwill observed, following a blow over the eye, much swelling and discoloration of the lids, edema of the conjunctiva, with a ragged cut thru that membrane upon the temporal side; the anterior chamber was filled with blood, the eyeball soft, the cornea clear, and the vision nil.

Bulson, while recognizing the serious nature of penetrating wounds of the eyeball, makes a strong plea for conservation in the treatment of such injuries. He lays down the rule that every injured eye possesses potential possibilities of being saved by proper treatment; altho conservation should not be carried to the extreme point where prolonged efforts are made to preserve a shrunken and sightless globe. He divides penetrating wounds into two classes—simple penetrating wounds, and those accompanied by the lodgment of a foreign body within the globe. Small and not infected wounds posterior to the ciliary region are comparatively inoffensive. The edges may be touched with tincture of iodine, covered with a conjunctival flap, and the lacrimal sac thoroly flushed with normal salt solution.

Larger openings into the vitreous chamber with considerable loss of vitreous even if not infected, do not offer so favorable a prognosis. But even such wounds, provided not more than approximately 20 per cent of the vitreous has been lost, should be closed with fine catgut scleral sutures, painted with iodine and covered with a conjunctival flap. Where there has been extensive loss of vitreous, prompt enucleation should be practiced. Active infection is not necessarily an indication for enucleation, for subconjunctival injections of cyanid of mercury, especially if made early, have been known to check severe intraocular infection.

In uncomplicated wounds of the cornea alone, sutures may facilitate prompt healing and help to prevent complications from prolapse thru delayed healing. A prolapse of iris usually calls for abscission. If the lens is injured and dislocated, and removal is possible without much loss of vitreous, attempts at saving the eyeball may still be made. Even in injuries involving the ciliary region treacherous as these are, a reasonable amount of conservatism is justifiable, depending upon the extent and nature of the injury and experienced judgment. The internal administration of calomel and sodium



salicylat and subconjunctival injections of cyanid of mercury are deserving of more extensive use.

Foreign bodies lodged within the eye should of course be removed when possible; even after successful removal the prognosis is always serious. Less than one-third of successful removals result in preservation of the eyeball, tho it is possible more might be saved if greater efforts were put forth to abort or lessen the infection. If it be remembered that sympathetic inflammation does not occur in less than three weeks from the date of the injury, a delay of 10 days or two weeks is comparatively safe.

The writer summarizes the aids in promoting the best results as follows: 1. Application of tincture of iodin to edges of all wounds after cleansing with normal salt solution; 2. Closure of all gaping wounds by sutures and covering with a conjunctival flap; 3. Bichlorid salve in the culdesac; 4. Iced compresses and the internal administration of calomel followed by large doses of sodium salicylat as a preventative of inflammation; 5. Subconjunctival injections of mercury to abort or retard infection; and lastly due consideration of the fact that sympathetic inflammation does not occur in less than three weeks from the date of the injury during which time efforts to save the eyeball are attended with little or no risk.

The account of the Halifax disaster by **Tooke** will be found in the *JOURNAL*, Vol. 1, p. 323. The leading features of a great number of cases that occurred was their improved behavior under open treatment and irrigation with the Dakin-Carrel solution, and the absence of secondary infection following necessary operations on the eyeball.

In **McKeown's** case of an inch long horizontal incision of the cornea and sclera, there was extensive loss of vitreous and a large prolapse of the iris; this was abscised. A few months later, when the eye was manifestly a danger to its fellow enucleation was advised but refused. In a case of wound of the sclera with continued severe hemorrhage that did not yield to ordinary treatment **Brunetière** and **Amalric**

sutured the wound which promptly checked the bleeding. The importance of suturing the eyeball and covering wounds with conjunctiva as soon as possible after injury has been urged by **Krusius**.

**Key** reports a case in which a penetrating wound 11 mm. long thru the limbus and cornea healed under a conjunctival flap with preservation of good vision.

In **Chance's** case, the lids, to the outer side of each punctum, were lacerated quite completely, in a line extending from the brow and lower orbital margin, which also severed the lacrimal canals. The cornea also had a clean linear wound. Complete healing resulted but with ectropion of the lower lid with annoying epiphora.

**Zentmayer** observed a girl six years of age, in whom the vision of the left eye was lost from an exploding dynamite cartridge; the skin in the periorbital region showed numerous small depressed scars; the lens was partially opaque.

**INJURIES FROM SPECTACLE LENS.**—**Gifford** argues that while spectacle lenses are very rarely a source of injury to the eye, they are much more frequently a valuable protection against injuries, so that he urges all persons who have only one eye or in whom the other is amblyopic never to go without good sized spectacles with strong rims. The protection which spectacles afford is so much greater than the risk which they involve that every person, child or adult, with only one good eye should habitually wear them.

In **Burns's** case a blow broke the spectacle lens, a piece of the lens cutting the cornea. The crystalline lens was also cut and the anterior chamber partially filled with blood. The reporter cleansed the anterior chamber and removed, as he thought, all of the lens substance; he dissected up the lower half of the conjunctiva and sutured it over the cornea to the upper conjunctiva; the cornea healed and about one-sixth of the lens could be recognized, not having been removed;

the latter became nearly absorbed, but the vision is nil.

**FOREIGN BODIES.**—A foreign body in the eye claimed by the patient to have been caused while following his regular occupation was shown by the nature of the foreign body not to have been so received. **Van Weerd** reports the case of a workman who claimed compensation for injury to the eye received from the harpoon in the course of his regular vocation, that of a harpoon fisherman. The injury consisted of perforation of the cornea; the piece of steel extracted from the eye was not derived from a harpoon as the claimant asserted. Professional compensation was accordingly disallowed. It is superfluous to state this did not occur in this country, but is reported from Holland.

**Teal** recalls that foreign bodies on the cornea constitute the majority of corneal injuries. In removing such bodies, the layman is apt to attempt too much, his efforts resulting in a large denuded area. He should limit his attempts to a cotton wound tooth pick, lightly brushing the cornea where the foreign body rests on the surface. Where the foreign body is embedded, it is necessary to lift it out under cocaine, for which purpose the writer prefers a sharp spud. When a small stain or eschar is present, it is best to remove this also unless it is too deeply embedded, when it may be left for 24 to 48 hours. The wound resulting may be cauterized or disinfected followed by petrolatum or yellow oxide of mercury and a light bandage. Injuries of the cornea without perforation are benefited by the application of heat. This may be applied by an electric light bulb held in contact with a wet compress, plus several layers of black cloth. Lime burns are treated as any corneal injury. In perforating wounds asepsis and antisepsis are as important as in abdominal injuries; protruding parts must be replaced or excised. Conjunctival flaps with suturing of the edges of the cornea are of great value.

In **Allport's** case, an electric flash occurred near the patient's face; so far as he knew no foreign body entered the eye. When examined the following

day both eyes were somewhat inflamed; the vision of both was 20/30; there was no abrasion by the fluorescein test, no opacity of the cornea nor of the lens. Examination showed a glistening foreign body at the extreme lower angle of the anterior chamber, corroborated by the X-ray. As the foreign body and iris were held together by sharp points upon the body, extraction with the forceps and a small iridectomy were necessary. Recovery with unimpaired vision took place.

In a second case reported by **Allport** the eye was struck by a small foreign body. Careful examination by a physician found nothing; but two weeks later the vision was impaired with the eye uninfamed. Examination disclosed a slight corneal opacity directly over the pupil; the lens was cataractous and exhibited a piece of steel in the center, corroborated by the X-rays; the steel was removed with a magnet, and the cataract, later, with good results. These cases are noteworthy in that they show the possibility of the eye harboring steel without the occurrence of immediate symptoms.

In a case in which a small fragment of brass was lodged in the iris near the lower angle of the anterior chamber, **Roy** seized the pupillary margin and drew up the iris so that the particle could be clearly seen. It was then easily removed with another pair of forceps. In other cases the foreign body was found embedded in the sclera or even outside of it.

**Boyd** observed a piece of steel lodged in the posterior lens capsule. In 30 days a traumatic cataract was visible with pain, redness and iridocyclitis. Upon subsidence of this inflammation, a cataract operation was performed and the steel came out with the lens; the foreign body should have been visible with the ophthalmoscope. The reporter observed that if he had seen the case soon enough, he would have removed the lens earlier—a procedure open to question.

**Buchanan** reports at some length an instance of metal embedded in the lens with restoration of normal vision after nine months. A brass finisher had



been struck three days before observation by a chip of metal, which the patient stated was soft iron, and the sight was becoming dim. There was a small wound of the cornea just beyond the pupillary margin of the iris; the anterior chamber was formed and the sphincter of the iris was cut just behind the wound. In the notch so formed, there was a small mass of grayish tissue lying upon the lens capsule; the lens was slightly opaque, and in the center of it there was embedded what looked like a small chip of metal. The metal seemed to be lying behind the center of the lens and to measure about 1 mm. in each direction. The eye was quiet, tension normal; vision 6/60. Ophthalmoscopic examination showed that the lens was slightly opaque, due to small faint clouds slightly denser around the metal than elsewhere, without any radial lines of opacity. In the course of the following nine months the lens cleared entirely with restoration of full vision. The metal became very clearly visible, sharply defined and perfectly bright (no rusting). The patient experienced no inconvenience whatever; he could see the metal in a mirror, for it is clearly visible to an attentive observation.

The history of this case would indicate that the metal must have been quite aseptic (it was possibly very hot) to pass through the cornea and iris without giving rise to infection. The wound of the lens capsule seems to have been plugged by a small portion of iris left in the minute opening; this would explain why the lens did not become entirely opaque; the minute clearing of the latter probably depended upon the youth of the patient—20 years. The absence of rust may be due to the fact that the metal was soft iron and not steel. It is quite possible that opacity may develop when age begins to tell on the lens, but several years of useful vision may be hoped for before this takes place. The reporter cites half a dozen cases from literature in which useful vision was retained (in two for a period of thirty years), with a foreign body in the lens, in nearly all of which the subjects had been quite

young when the accident occurred, probably a determining factor in the favorable result.

In **Sweet's** case of injury from explosion of a dynamite cap, the left lower eyelid was wounded and a scleral wound was present, slightly below the horizontal meridian on the nasal side and about 4 mm. back of the limbus. The anterior segment of the eyeball was normal, the vitreous clear, and the fundus normal. Suspended in the vitreous a short distance back of the lens, slightly below the horizontal and about 1 mm. to the temporal side of the vertical plane, could be seen a thin, flat, silvery body, somewhat curved in its upper portion, which rotated on its vertical axis in movements of the eyeball. A number of sets of X-ray plates were made with the tube in various positions, but in no instance did the shadow of a foreign body appear on any of the plates. During the four weeks that the case was under observation there was no congestion of the external tunics of the eye, the vitreous continued clear, and the body remained in its first position. Toward the end of this period, there was greater movement of the body in rotation of the eyeball; but it always returned to the former situation. Careful examination failed to show the object to be an extraneous foreign body. The scleral wound and the appearance of the body seemed to point to its metallic nature, probably copper. The reporter believed that by illuminating the object through the dilated pupil by a hand mirror, it would be possible to enter a pair of Matthieu forceps through a scleral opening and secure the metal, though in the event of failure, enucleation would be necessary. Dr. Sweet believed the vitreous would ultimately become cloudy and the eyeball lost.

In **Spencer's** case both eyes were penetrated by foreign bodies from an explosion of dynamite caps. An hour after the injury, the right eyeball presented a punctured wound in the sclera about 2 mm. from the inner limbus, through which the iris had prolapsed; the left cornea showed a vertical linear puncture with a cut in the iris and the



anterior chamber filled with blood. Repeated X-ray examinations were negative, although the probabilities were strong that foreign bodies were present—copper, dirt or gravel. Seven weeks later, vision of the right eye equalled 6/20, that of the left 3/120; there was a large floating veil in the vitreous apparently attached to the scleral wound at the inner limbus, upon which a glistening metallic point was visible, the movement of which as the exudate moved may have been the cause of the failure of the X-rays to reveal the same.

**Zentmayer** reports injury from a dynamite cartridge; there was loss of vision in the left eye; no injury to the right eye was suspected; the left lens was partially opaque and the vitreous filled with a dark mass which appeared to contain a foreign body. The right cornea showed a very small macula at its lower outer margin; the lens was clear; in the vitreous, there was a shining, apparently metallic, oblong foreign body about one-half the diameter of the disc in length, and the diameter of a main trunk of the central vessel in width; there was a small irregular whitish lesion in the retina in a line with the foreign body. The radiograph showed, on the left side, numerous small foreign bodies scattered thru the orbit and eye. On the right side there were two shadows; no response was obtained by application of the magnet to the sclera. The reporter did not feel justified in attempting to remove the foreign body with forceps thru a scleral wound, as the eye was now normal aside from the foreign body. He thought the case should be watched; and, on the first appearance of irritation or synchysis, extraction of the foreign body should be attempted.

In **Claiborne's** case the eye was struck by a piece of metal in rebound from a Remington bullet against a piece of steel. The reporter saw the patient two days after the accident. There was a ragged wound of the cornea; the iris was torn and prolapsed into the corneal wound, the lens was cataractous. As the bullet was known to contain a small proportion of steel,

attempted removal was made with the giant magnet, but without effect. The prolapsed iris was removed and the wound treated antiseptically; recovery was uneventful with absorption of the lens at the end of six weeks, with vision 20/30 under the correction. The X-rays showed a foreign body just in front of the nerve head apparently encysted.

**Jessop** observed, one hour after an eye had been injured by flying splinters of steel, a scleral wound of that eye. In the macular region were 3 small polished black spots, and also limited edema. In the vitreous was a grayish veil, passing outwards to a white patch in the sclera at the nasal side of the optic disc. Skiagrams showed a foreign body in or just beyond the sclera. Vision equalled 6/9; three weeks later the eye had quieted down, and a small horizontal scleral wound, without any foreign body was seen at the nasal side of the optic disc. Some limited edema and the superficial black pigmentary changes at the macula were still visible. The principal interest in this case lies in the two facts: (1) That pigmentary changes at the macula should occur as early as one hour after the injury; and (2) that such changes should interfere so little with vision.

**Ziegler** operated upon a patient with copper in the vitreous nine years ago. The eye is now still absolutely free from all signs of inflammatory disturbance or other sequelae and has vision 20/40. In another case, the foreign body appeared to be imbedded in the sclera from explosion of a cartridge; there were floating opacities in the vitreous from probable hemorrhage; the fundus was hazy. In the nasal side to the far anterior and a little below the horizontal meridian, there was a large area of whitish exudate which seemed to be located in the ciliary body. The X-rays showed the foreign body.  $1\frac{1}{2} \times \frac{1}{2}$  mm., 13 mm. back of the cornea, 4 mm. below the horizontal plane, and 12 mm. to the nasal side of the vertical plane, which would make it appear that the foreign body was just outside the sclera. Vision equalled

20/100 with normal tension in each eye. An exploratory operation was performed; careful examination of the sclera and tissues outside of the eye failed to show any foreign body protruding from the globe, nor was there any metal located in the surrounding structures. The wound was closed, another X-ray photograph showed that the foreign body had not been disturbed. As the body was evidently located in the scleral tissue, it was allowed to remain and the patient kept under observation. The swollen area in the fundus over the site of the foreign body has greatly subsided and become somewhat atrophic. There has not been any inflammatory disturbance; the corrected vision equals 20/50.

In **McMullen's** case the left eye was struck by a fragment of steel. A year later vision equaled 6/60 to 6/36; slight ciliary and conjunctival congestion; iris changed in color; pupil slightly irregular, and almost inactive, vitreous opacities. A flake of metal, 4x2 mm., localized 4 mm. behind, 8 mm. below, and 8 mm. external to center of cornea, was extracted by Haab's magnet, and iridectomy required by the fragment's becoming entangled in the iris. Eleven months after operation, vision was fingers at 1 foot; the iris showed characteristic rusty discoloration, vitreous opacities, retina detached below; details of fundus blurred; no inflammation and no pain.

**Bane** reports a case where the patient felt something strike the left eye, but was not certain whether it hit the lid or eyeball. There was no pain, no sensation of a foreign body in the eye, but merely a slight discoloration of the conjunctiva on the temporal side. Vision good in each eye. Ophthalmoscopic and sideroscopic examination were negative at this time, and it was difficult to believe that there was any foreign body in the eyeball. The X-rays however showed a minute foreign body 11 mm. back of, 7 mm. below and 5 mm. to the temporal side of the center of the cornea. Another sideroscopic examination was now weakly positive, showing the same to

be a fragment of steel. Two weeks after the injury the foreign body was removed with the hand electro-magnet thru a scleral incision, resulting in excellent vision.

In **McKeown's** case of steel in the vitreous, with cataract following and the lens twice needled (See Y. B. v. 13, p. 353), the vision has now reached 20/30 after removal of the steel from the vitreous with the giant magnet. The steel had remained in the eye two years. The reporter desired to remove the steel long before but the patient would not consent.

**Haas** reports a case of slight injury to the eye received twelve years ago which attracted hardly any attention at the time; six months later the vision began to fail. At present the iris is atrophic, the lens absorbed, leaving its capsule thick and of a brownish color, the vision almost nil. Examination with a sideroscope gave a positive result, but the magnet did not attract the foreign body at once. After ablation of the capsule, the magnet showing a magnetic field, a tip of soft iron, introduced into the vitreous chamber, removed a small piece of iron covered with rust.

**Shackleton** analyzes 35 cases of intraocular foreign bodies from his own experience. In 15 the foreign body was in the vitreous, in 2 in the lens, in 4 in the anterior chamber, and 1 in the posterior chamber; in 4 cases it was entangled in the iris, and in 5 it was lodged in the ciliary body; in the remainder the site was not mentioned. There was traumatic cataract in 6 cases; in 6 cases it became necessary to remove the globe. As to the route of removal of the foreign body, in 23 it was removed thru the original wound in the cornea, and in 4 thru that in the sclera, while in 5 cases a new opening was made in the cornea, and in 3 in the sclera; the length of time of residence in the eyeball varied from 1 hour to 22 months. Of the 35 cases, useful vision was retained in 17, with an average of better than 6/7.5. The writer's experience in these cases convinces him that the anterior route will as a rule yield the best result; in no case in



which the original scleral wound is not open, would he choose the scleral route unless the foreign body could not be brought into the anterior chamber after prolonged effort.

**Griffith** observed a soldier who had had one eye removed for injury from shrapnel, and the other eye showed a piece of metal just below the macula; vision less than 6/60 and J. 16. The eye was quiet without reaction of any kind; the piece had been in the eye for over two months. It was thought best not to interfere. The galvanometer afterwards showed the metal to be non-magnetic.

**Hertel** has observed 242 intraocular foreign bodies during the present war, of which 60 per cent were of steel; the others of copper, brass, powder, stone, wood, straw or glass. Almost all of these cases appeared to be caused by explosions, as shown by multiple lesions of the face, involvement of both eyes (21 per cent), multiple ocular fragments. The force of the explosion provokes extensive intraocular hemorrhages; very small bits (2 mg.) penetrate as far as the posterior hemisphere; the foreign body may penetrate the lid and frequently detaches splinters of bone from the orbital margin. Double perforations are common. Radiography and the sideroscope are indispensable for the diagnosis; metallic fragments of less than 3 mg. fail to show by radiography; Hertel's sideroscope reveals metallic fragments of 2 mg. In case of multiple fragments or double perforation, both methods may fail.

Extraction is performed as in civil practice with the electro-magnet; but while the failures are 8 per cent in the latter, they amount to 30 per cent in military surgery. Intervention is more tardy, force of penetration greater, double perforation more frequent. The fragments from grenades are irregular in shape, toothed and often consist of alloys into which enter phosphorous, nitrogen, manganese; they are attracted with much greater difficulty by the magnet than the bits of steel commonly dealt with in civil practice. These alloys hasten the occurrence of

siderosis; in one preparation, the latter was distinctly apparent the 24th day, in another, siderosis of the choroid could be perceived.

In several cases copper and brass were extracted but half of these cases were followed by loss of the eye from infection, detachment of the retina or the presence of other fragments more deeply situated. Bits of stone were removed from the anterior chamber and upon two occasions from the deeper portion with preservation of the eyeball. In some cases fragments imperfectly localized as well as powder were well borne by the eye. Glass was almost uniformly infected in every case. In a single instance only was a piece of spectacle lens removed with a successful result. Straw and wood were removed only from the anterior chamber and never from the deeper parts. One preparation shows a piece of straw and an infection by the *b. subtilis*; another numerous giant cells about a fragment of wood. The difficulties of treatment demand early removal of these cases to a well organized ophthalmic service.

**Terrien** while agreeing with the common opinion that metallic bodies known to be in the eye should be extracted at once (preferably by the anterior route), calls attention to the well known fact that occasionally the foreign body may not only be tolerated but its presence be compatible with relatively good vision; and that while tardy extraction may be subject to many difficulties, even large bodies have been removed several months after penetration, and that one would not entertain the idea of exposing to all the dangers of extraction, an eye possessing good visual acuity. He reports five observations of foreign bodies within the eyeball, shown by radiography or the ophthalmoscope, well tolerated, causing no pain and with relatively excellent visual acuity. He thinks that such cases deserve attention; they may be more numerous than is generally believed. He could add to the number from his experience where the foreign body was perfectly well tolerated although the vision had



been lost thru detachment of the retina from the original injury.

In the case of small nonmagnetizable foreign bodies lodged in the anterior chamber, **Koster** warns, that no attempt must be made to extract thru a straight incision, and that surgical forceps must not be used to seize them; a pair of fine but strong anatomic pincers is the proper instrument. The opening by which the foreign body entered must be enlarged; or, better yet, a new angular opening made to form a flap that can be lifted up with a sharp hook. The Graefe knife is the instrument to use and it may be advisable to make a third incision to get a square flap, aiming to have the base of the flap on the side of the limbus; a flap injures the eye less than groping around thru a straight incision. Even if extraction fails the first time, it is better to try again than to advise enucleation.

For a very small splinter of metal, when the wound of entrance has already closed, an incision should be made in a radial direction at the extreme periphery, cutting around the edges with a Graefe knife; the scleral tip of the incision is then pressed down with the hand magnet which brings the scrap of metal into view. With other technic the scrap is liable to be held back by iris tissue; even a strong magnet is unable to extricate it then. The mistake is often made of making the incision too much in the cornea, by using some other instrument than the Graefe knife. The smaller the particle the harder it is to remove as a rule.

In **Smith's** case the cornea was lacerated by a splinter of wood; the foreign body had penetrated the lens causing it to become cataractous; there was also a cut of the iris with an anterior synechia. Forty-eight hours after the accident, the lens began to swell, so that iridectomy and extraction of the cataract were performed; when the lens

was removed, an eyelash was found driven thru its center; the hair could be moved to and fro in its tunnel-like opening; the lash had evidently been carried into the eye by the wood.

**Begle** discusses the effects of cilia in the anterior chamber and reports three instances, in all of which the causative traumatism was so severe as to mask the part played by the cilia, altho an exudate had taken place about the cilia in two of the cases, and a bleb-like swelling of the epithelium about the corneal wound containing the base of the cilium in the third.

**Distler** observed injury of the cornea with transplantation of two eyelashes into the anterior chamber, where they remained visible after healing; one rested on the lower margin of the pupil, the other upon the inner lower surface of the iris near the angle of the chamber.

**Leoz Ortin** reports a case brought to his attention on account of a papillomatous growth at the upper margin of the cornea. A hard mass was felt in the orbit, and from it he removed a piece of wood 38 mm. in length and 12 mm. in diameter, which had been in the orbit for eight months.

LOCALIZATION OF FOREIGN BODIES.—**Belot** and **Fraudet** insist upon the advantages of rapid radioscopy; and of radiography in five positions, according to a geometric system they have invented. With this system they were able to locate minute scraps even of aluminum, stone or glass; in one instance a particle of the latter substance 1 mm. long by  $\frac{1}{2}$  mm. wide and thick was accurately determined. With their system all that is required for exact localization is to outline a curve, and draw the outline on transparent paper placed over the five radiographs in turn; the tracing thus obtained locates the foreign body with precision.

(To be continued)

# DIGEST OF THE LITERATURE.

## INJURIES.

THEODORE B. SCHNEIDEMAN, M. D., F. A. C. S.

PHILADELPHIA, PA.

(Continued from October issue)

**Eaton** writes a lengthy paper with 23 illustrations, a number of mathematical formulae and 4 tables, upon the determination of position of foreign bodies in the eyeball; the paper should be consulted in the original. **Edwards** employs and describes Sweet's method of localizing foreign bodies. **Adam** believes that stereoscopic radioscopy possesses not only the advantage of greatly facilitating orientation, especially in wounds of the head and localization of the shadows, but also, by superposition of the images, making the shadows much more intense and well defined than simple radiography. He explains the technic and shows how with the usual apparatus the procedure is readily carried out; a special chamber and screen are the only necessary adjuncts.

**Coleman** advocates removal of foreign bodies from the vitreous by the scleral route; he endorses the movable magnet (sideroscope) and X-rays for the detection of magnetizable bodies within the eye; the former, when positive, may suggest exposure of the plate at an unusual angle when a foreign body which has failed to show upon the plate in the usual exposure, will appear. He refers to a case in illustration.

**Whitehead** refers to the subject of localization of foreign bodies, especially such as are magnetic. In some cases the body can be seen by direct inspection, in others localization is assisted by noting the point of penetration, and where present, the corresponding wound of the iris or lens. Where the penetration has been behind the lens, the foreign body can sometimes be seen with the ophthalmoscope. The sideroscope may detect its pres-

ence. The X-rays are the most valuable method of all. The telephone probe would not be of much assistance in the eyeball itself, but it might be of great value in the orbit.

**Crigler** observed a case of steel in the vitreous with retention of useful vision (20/30) and no inflammatory symptoms and without siderosis. The X-rays located the foreign body, 1x3 mm., near the posterior margin of the ciliary body. Removal of the foreign body was advised but refused. The body was not detected by the physician who attended the patient immediately after the injury.

**Dor** reports eight observations of undiscovered intraocular foreign bodies. One of the cases had been examined by three specialists and another by five. The symptoms were those of acute inflammatory glaucoma, intraocular infection or traumatic cataract. The point of entrance was in the sclera in every case, so that after a few days it was no longer discernible. The X-rays always revealed the foreign body.

In **Pontius'** case, the sclera had been struck by a shot from an air rifle about 10 mm. to the outer side of the cornea. Twenty-four hours after the accident, nothing was noted but the external injury to the sclera which showed as a circular area of hemorrhage 2 mm. in diameter; 8 days later this area began to bulge. The fundus at present shows a patch of choroiditis beneath the site of the scleral wound, the surrounding choroid presents some deep effusion and is slightly elevated; there is, however, no retinal detachment. The disc presents slight early changes of optic neuritis.

MAGNET OPERATIONS.—**Butler** describes the *ring-magnet* introduced by

Prof. Mellinger of Basle. In this form the lines of force lie parallel and do not diverge as in the ordinary magnet; in consequence, the tractive force is great along the central axis at right angles to the plane of the ring, outside of which the force rapidly falls off. The advantages of this instrument as against the ordinary pattern are believed by the writer to be so great as to completely outclass the older instruments. In every case of steel in the eye, where the ring magnet failed, he has employed the Haab; in no single instance has the Haab removed the foreign body under these conditions.

The advantages of the ring magnet may be summarized as follows: (1) The operation can be performed with the patient lying upon the table. (2) The patient need not be moved when the splinter has appeared in the anterior chamber. (3) There is no necessity for using a hand magnet. (4) The power of the ring magnet at its center is great, and is under absolute control. (5) It is much easier to operate with the rods upon a motionless patient, than to have to move the head this way and that before the giant magnet. (6) A patient sitting before the giant magnet may experience pain and move at the critical moment. The only valid objection to the ring magnet is, that as the force is considerable only at the center of the solenoid, the eye must be kept in the center, but as to this, there is no difficulty in placing the eye in this situation and keeping it there. The author has succeeded in removing pieces of steel from the cornea which were difficult to extract with a needle.

**Bartels** has written on the use of the magnet for ocular injuries in the field. **Le Roy Thompson** reports six cases of eye injury with penetration of foreign body, all of which resisted the magnet, and the eyes were enucleated. The pieces of metal were embedded in the sclera. **Campbell** reports a case of foreign body which also resisted the magnet, and the eye was enucleated. He points out that this failure of removal of the foreign body is an absolute indication for enucleation. **Claiborne** reports three cases in which magnet ex-

traction was attempted, but in only one of which it was successful. **Kelsall** reports two cases of successful extraction with the small magnet. In one of them the Haab magnet had previously failed to give any result.

As against Haab's assumption that most foreign bodies are spindle shaped and smooth, **Pooley's** experience is that they are more frequently irregularly triangular flakes with sharp angles, much inclined to turn broadside on when they meet any resistance. When the foreign bodies are situated in or behind the lens, his rules are: Not to make any attempt to remove the foreign body before its situation has been carefully localized; a few days' delay makes no difference in the result; do not use a trial pull, nor pull on the ciliary body; the foreign body should be removed from the nearest point; no attempt should be made to remove a foreign body imbedded in the choroid. His present practice is as follows: 1. If the lens is badly wounded so that it must become opaque and swell, and the foreign body is situated immediately behind it, he removes the lens and then the foreign body by pulling it into the anterior chamber. 2. If the lens is intact or but slightly wounded, or for other reasons it is not desirable to remove the lens, and the foreign body is situated behind it, he removes the foreign body thru an incision behind the ciliary body, usually behind the insertion of the extrinsic muscles. The advantages of a scleral route are: 1. The operation is easier and there is no resistance to the passage of the foreign body; the vitreous is but little disturbed. 2. The inflammatory exudate may even come away with the foreign body. 3. The ciliary segment is not bruised. 4. A sutured conjunctival wound is much less liable to late infection than a corneal wound. The disadvantages of the scleral route are: Impaction of the choroid, retina and vitreous in the wound; but this very rarely occurs. He claims the following special advantages: 1. A large percentage of eyes is saved. 2. Better visual acuity. 3. Shorter period of convalescence.



**Whiting and Goulden** give a minute and detailed exposition for the extraction of magnetic foreign bodies from the eye. Some idea of the number of their cases will be gathered from the fact that in one month they removed magnetic foreign bodies from within the globes in 30 cases; in one day 5 such cases were operated upon and more recently 13 in one week. All these occurred during the past 12 months in the military hospital to which they were attached. The object of their paper is to give a detailed description of the use of the Haab and small magnets in combination—of which combined method the details have not been published. The paper should be consulted in the original.

**Lamb** presents the arguments in favor of, and against, the anterior chamber and scleral routes respectively in the magnet operation. He cites authorities with reports of final results for each method. He concludes that it is best to evade any definite statement, and that the method of extraction should be adapted to the individual case. Both the large and small magnets should be in the oculist's armamentarium—as conceded by both Hirschberg and Haab.

**Calhoun** details three illustrative cases of removal of metallic bodies from the eye with the magnet. He lays down the following deductions: (1) The advantage of immediate attention. (2) The necessity of X-ray localization. (3) The anterior route is the one of choice for extraction, although scleral incision is occasionally necessary; and only as a last resort should the tip of the magnet be introduced into the vitreous chamber.

**Higbee** argues in favor of the scleral route for removal of foreign bodies as being much simpler than the anterior chamber route; he thinks fewer complications are met with. Of 200 personal cases the vision was 20/20 in 42, 20/40 in 49, useful vision in 76, no vision but eyeball retained in 20, detachment in 8, enucleation in 5,—a record which will certainly bear comparison with that of any other method.

**Gibson and Pockley** have written on magnet extraction. **Van der Hoeve** urges the importance of prompt removal of bits of iron from within the eye. He reports two cases, in one of which there had been no trouble from a piece of iron embedded in the iris for seven years. Then symptoms of siderosis developed.

**GUNSHOT WOUNDS OF EYEBALL AND ORBIT.**—**Rollet** and **Velter** observed, of 3,915 wounded, 343 instances of lesions of the deep coats of the eye without disorganization of the eyeball, a percentage of 8.76. Lesions produced by intraocular bodies, cases in which the vitreous is filled with blood and wounds of the anterior segment of the globe are excluded. In 145 cases the impact of the projectile was directly upon the eyeball; in 128 the impact was upon adjoining structures, particularly the outer portion of the orbit. The writers grouped their cases under the following headings: 1st, detachment of retina, 43 cases; 2nd, detachment with exudation, resulting in proliferating retinitis or cicatricial bands, 37 cases; 3rd, rupture of the choroid, 133 cases; extremely variable in extent and position; 4th, choroidoretinal hemorrhages and resulting changes, 130 cases, of which 38 were in the macular region; 5th, concomitant lesions of the papilla from simple hyperemia to atrophy. The prognosis is naturally uncertain; where the macula has not been irremediably damaged, a considerable degree of vision may be regained after the lapse of a considerable period.

**Orendorff** reports a case in which a bullet was removed from the orbit after being embedded there for ten years. (*A. J. O.*, v. 1, p. 113.)

**Harris** reports and illustrates with skiagrams a case in which a bullet appears to have entered by the left inner canthus, and to have passed along between the eyeball and inner wall of the orbit, until it reached the apex of that cavity, then turning downwards, inwards, and forwards, it described an angle of more than 180 degrees, and entered the sphenoidal sinus, wounding in its course the third and optic nerves;

ptosis and left optic atrophy followed. The bullet was successfully removed.

In **Birch-Hirschfeld's** case, a soldier was injured by a rifle shot. He was unconscious for quite a time, and after recovery, the right eye was found to be blind. Four months later, the reporter found a scar at the wound of entrance in the middle of the forehead, above the root of the nose. The point of exit was on the right side of the neck between the right inframaxillary angle and the insertion of the sternocleidomastoid muscle. The right eye and its surroundings showed no external changes; it deviated a little outward; the pupil was enlarged and reacted slightly to light; motility was somewhat impaired; vision equalled fingers at 1 meter eccentrically. As the vitreous was only slightly opaque a good ophthalmoscopic view was obtained; the disc appeared to be separated into two parts vertically; both parts had a reddish color from each of which numerous arteries and veins emerged which could be traced far into the retina. The separating surface was covered by a grayish white new formation projecting into the vitreous; there was an extensive chorio-retinitic focus with pigment and grayish white patches; the retina was detached upon the temporal quadrant. Oblique laceration of the optic disc and a gaping wound of the sclera was diagnosed. An unusual feature of the case was the fact that the optic nerve did not become totally atrophic and that the central artery of the retina was not severed also.

#### WOUNDS OF TRACTS AND CENTERS.—

**Velter** has published a very complete study and analysis of the cases he observed from September, 1914, to November, 1915, in a service of cranial surgery in a first line military hospital. Grouping the cases studied, the writer believes that an anatomic classification is the only rational plan, being rendered possible by the principle that surgical exploration is indicated in all wounds of the head, even if apparently unimportant. He divides the cases into 5 groups: (1) Cranio-cerebral penetrating wounds with extensive traumatism; patients moribund. (2) Pen-

etrating wounds of the cranium without puncture of the dura. (3) Penetrating cranio-facial wounds. (4) Tangential wounds. (5) Penetrating cranio-cerebral wounds properly so called: (a) with occipital lesions and visual disturbances; (b) with lesions of other regions of the encephalon; (c) with deeply penetrating projectile.

In addition to detailing the nervous and general symptoms, the writer insists upon the frequency and importance of precocious ocular disturbances, which latter are so generally neglected by surgeons in wounds of the cranium; it is indispensable to recognize and search for these however, for they invariably give valuable indications and require in many cases appropriate treatment. Velter describes the various disturbances of vision which he has noted. Motor involvement consists of paralysis of ocular muscles. Pupillary lesions are quite frequent; mydriasis occurs in all cases of extensive lesions of the cranium and encephalon, which rapidly tend to a fatal issue; giving place to miosis when lesions of the deeper part are present which bleed freely and are recognizable by intense contractures and convulsions. When the membranes are intact, mydriasis is exceptional. Modifications of the pupillary reflexes are very rare. The writer has encountered only three cases of papillitis or papillary stasis.

He records four instances of hemianopsia in occipital lesions; in five cases without hemianopsia he has noted narrowing of the visual fields; such contraction of the field in the absence of any ocular and papillary lesion is extremely persistent and forms part of a late syndrome of penetrating wounds of the brain, its pathogeny is unknown. In a final chapter the author describes the late accidents of penetrating wounds of the cranium and gives a resumé of the indications for cranioplasty. For personal statistics, of 19 cases of penetrating wounds not trephined, 18 were fatal. Of 62 cases trephined 10 were fatal; operative mortality 16.1 per cent.

**Evans** details the histories of five cases of intracranial injuries. In one



the subdural hemorrhage was on the side opposite the choked disc, and in another on the same side—thus demonstrating the value of choked disc in the diagnosis of so-called closed cranial injuries with intracranial tension.

**Löwenstein** and **Neuhals** report of 57 injuries of the skull, 32 showing inflammation or choking of the optic disc. In 23 skull injuries, the paralysis continued until recovery or death, excepting in one case, while the paralysis recovered in 6 cases which presented a normal optic nerve, thus indicating that changes of the disc are of bad prognosis in injuries of the skull. Of 32 cases showing such changes, 26 were infected and 6 not; in the latter the dura was intact with increased intradural pressure; in the 26 remaining cases the dura had been opened. The various consequences of skull injuries, such as increase of intracranial pressure, suppuration of exposed parts of the brain when the dura is opened, all cause changes of the optic disc which can be observed with the ophthalmoscope.

In **McHenry's** case of a man aged 74, following a shot beneath the left eye, blinding the same, complete right sided hemiplegia without aphasia occurred; with beginning signs of medullary compression as evidenced by lowered pulse rate, rise in temperature and diminished respiration. The cerebro-spinal fluid was under pressure, as shown by lumbar puncture and ophthalmoscopic findings (obscuration of the optic disc of the right eye). The combined symptoms and signs of hemorrhage in the brain, together with other clinical signs, were also positive. Cranial decompression operation was performed on the left side, which released a quantity of free dark blood, subdural. Complete recovery ensued; the left eye remaining totally blind without impairment of vision of the right eye.

**Roche** has collected histories of 11 cases of paralysis of the *cervical sympathetic* following wounds received in war; 4 were personal and hitherto unpublished. He tabulates them showing which of the signs of sympathetic

paralysis were present in each case. These signs are: Miosis, ptosis, enophthalmos, ocular hypotony, secretory disturbance, vasomotor disturbance. Not one of the 11 cases showed the complete syndrome—known as the Claude Bernard-Horner syndrome. Miosis was present in every case; enophthalmos in 10; vasomotor disturbance in 6; ptosis in 4; no case showed hypotony. The writer points out that it is impossible to state certainly which ganglion or branches of the sympathetic have been wounded. He suggests that the variation in the clinical features may depend upon the situation of the injury.

**BIRTH INJURY.**—In **Monaghan's** case, a child of five, there was a history of forceps delivery with a contusion over the left eye. The eye was blood shot for three months and has squinted. The lens of the left eye is now cataractous and that of the right cloudy.

**Friedenwald** saw a child one and a quarter hours after birth with the left eyeball completely luxated. After unsuccessful efforts to reduce it an incision was made at the outer canthus and then reduction was easy. Apparently no permanent harm resulted from the accident. (*A. J. O.*, v. 1, p. 9.)

**GENERAL PAPERS.**—**Wessely's** manual is intended for the general practitioner, especially the ambulance surgeon; it is a kind of "first aid surgery" for the eye. The author notes the increase in the proportion of wounds of the eye in the present war. According to his statistics, 30 per cent of wounded eyes retain useful vision. Foreign bodies of the cornea and conjunctiva are sometimes very numerous; they should be removed carefully to avoid extensive opacities. As regards lesions from shell shock, i. e. commotion of the retina, he emphasizes the disturbance of "Berlin." The entire retina is discolored, whitish; the vision is almost lost, but the prognosis is good. In complete destruction of the eyeball, enucleation is advised and not evisceration on account of the dangers of sympathetic ophthalmia. But there should be no haste, for this



complication does not occur before the fourteenth day. If the eye can be preserved, prolapsing membranes should be resected, the sclera and cornea sutured and covered by conjunctiva.

Foreign bodies should be removed by the electromagnet. The author has devised a glass shell rich in lead which shows to radiography; applied to the eye, it serves to localize foreign bodies. He recommends the sideroscope, and insists upon the gravity of foreign bodies allowed to remain (sympathetic ophthalmia, atrophy). He considers the extraction of nonmagnetic foreign bodies, advises waiting at least 6 months or even a year before operating upon traumatic cataracts on account of the danger of hyalitis or cyclitis. He speaks at length of sympathetic ophthalmia, thinks that the period of danger extends from the fourth to the tenth week, notes the low incidence of this complication in the present war (8 cases in the German Army), a circumstance which he attributes to early preventive enucleation to be performed whenever an eye can not be preserved. Sympathetic ophthalmia rarely follows enucleation.

*Orbital lesions:* the writer studies wounds tangential, sagittal, usually fatal perforation of both globes (rare 1/100 of all ocular lesions), section of the optic nerve, of the ciliary vessels, muscles, rupture of the choroid and retina, retinitis proliferans, ("sclopetaria") lesions of the chorio-retina from concussion. He discusses extraction of projectiles from the orbit; infection is rare even with fragments of grenades; the indications for removal should be based upon the size, form, seat, radiography. Shrapnel from its chemical composition occasionally excites a mild inflammation; extraction should be performed if possible, but small particles lying deep in the orbit should be left. Indirect lesions of the orbit: traumatic exophthalmia and anophthalmia, fractures extending from the base, habitually fatal, lesions of the optic nerve at the foramen, hemorrhage into the sheaths, pulsating exophthalmia, luxation of the globe, traumatic

anophthalmia with fracture of the orbit.

The final chapter is devoted to the fundus; papillary stasis is a sign of hypertension, neuritis of intracranial inflammation. It is frequently impossible to make the distinction with the ophthalmoscope. These symptoms are present in one-half of the wounds of the cranium. The papillary changes are more marked upon the side of the lesion; the site of the wound has little influence. Following intervention, in favorable cases, the papilla resumes its normal appearance. If stasis persists, associated with other symptoms of hypertension, operation is indicated. Late appearance or return of stasis is of grave prognosis; the ophthalmoscopic appearance alone should only be decisive in exceptional cases in regard to intervention, but it is an important element. The author concludes that in every case of wound of the cranium, if the condition of the patient permits, not only should the ophthalmoscope be used, but examination into function should be made as well, including visual field, visual acuity and light sense.

**Von Szily's** *Atlas of War Ophthalmology* contains an extensive review of the literature as well as the personal experience of the writer. It is impossible to give a satisfactory review in a reasonable space. The subjects considered come under several heads with which they are naturally associated: these are ocular lesions in wounds of the cranium; wounds of the temporal wall of the orbit from firearms; hemianopsia in war; penetrating wounds of the orbit and its neighborhood; extensive destructive lesions. The work as a whole is characterized by a French reviewer as "conscientious but without originality."

**Giuseppe** calls attention to the exceptional frequency in this war of wounds of the head and eyes. In mountain warfare scraps of stone broken off and propelled by explosions increase the danger for the eyes. Another danger is trachoma and other eye affections from prisoners, and from such infections in the trenches just vacated by the enemy. The toxic lacri-

inating gases are far less dangerous for the eyes than the usual asphyxiating gases; the latter, when they act upon the eyes long enough, render the cornea insensible. If the injury is severe small foci of necrosis develop, with violent pain, leading to complete destruction of the eyeball. In this writer's experience, 16 per cent of the war injuries of the eyes were from machine guns or shrapnel, 50 per cent from flying scraps of stone, 5 per cent from trachoma, and 25 per cent from asphyxiating gases.

**INDUSTRIAL INJURIES.**—**Posey** refers to the large number of injured eyes from industrial injuries in the United States. Of two million nonfatal accidents, probably 160,000 are accidents to the eyes. Of 100,000 blind in this country, approximately 10,000 lost their sight as the result of accidental injury in industrial occupations. Of the ordinary menaces to the eye the most common are: Burns from molten metal, "chipping" of metal surfaces, explosion of gauges, emery wheels, the breaking of particles of metal from the head of damaged tools (mushroomed), blasting from premature or delayed explosions, exposure to excessive heat and light and inadequate illumination of work rooms.

Among preventives for minimizing these dangers are, education of employes and proper first aid to the injured, which should consist in the application of a protective bandage and the prohibition on the part of fellow workmen to remove foreign bodies with dirty instruments, occupy a prominent place. Protective goggles are indispensable in exposed occupations. The apparent danger of injury to the eye from breaking of the goggles is not well founded. Such goggles have proved their worth in reducing the number of injuries to the eyes wherever they have been used. A special form of goggles is necessary when the eyes are exposed to intense heat and light rays. Those suggested by Prof. Pfund of Johns Hopkins University promise best. These are made by coating a flat piece of Crookes or other similar glass, with an extremely thin

layer of 22 kt. gold, the latter being protected by a flat piece of hard white crown glass.

The Bureau of Standards in Washington has been making spectrophotometric examinations to determine the transmissibility of ultraviolet, visible, and infrared rays, and the results may be expected to lead to valuable information in regard to the kind and color of glass to be employed.

**Würdemann** has written the section on occupational injuries and diseases of the eye for Kober and Hanson's *Diseases of Occupation and Vocational Hygiene*. **Barkan** has written on common ocular injuries from industrial accidents.

**WAR INJURIES AND THEIR REPAIR.**—**Duverger** writes an extensive paper upon two months' experience in an ophthalmic hospital for wounded soldiers. He emphasizes two important points which his experience amply corroborates: 1st, the necessity of an oculist near the front in all large centers for wounded soldiers. 2nd, all wounds of the orbital region and of the globe should immediately receive every necessary operative attention; to render this possible, medical units at the front should be provided with a complete outfit.

Without dwelling upon statistics, which it is not his intention to give, he refers to the large number of wounded which came under his care during the two months. In a single day, following an attack, he noted 11 penetrating wounds of the globe and some 30 different palpebro-orbital lesions. Upon the same day a total of 725 wounded were cared for at the hospital.

A detailed review of this paper cannot be given here: a circumstance strongly emphasized is the necessity of careful and exhaustive examination of every case of wound of the eye and adjacent parts, however trivial in appearance; particularly the necessity of determining the question by all means at our command, whether or not the eye harbors a foreign body. Like so many papers which deal with the surgery of the present war from the pens



of the surgeons who are actively engaged, this communication is replete with interesting observations and conclusions. A critical analysis of such work as a whole must be left to a subsequent time of greater leisure.

**Bourdier** finds that the percentage of eye lesions have increased from 1-1.5 to 5.7 per cent with trench warfare. Next to contusions, penetrating wounds are the most frequent—of 633 ocular lesions, 174 were perforations, about 26 per cent. According to **Genet's** statistics 6 per cent of ocular traumatisms lose both eyes. **Petit** estimates that it is possible to preserve the globe in 26 to 74 per cent of the cases. **Cosmetatos** reports of 118 cases in the Greco-Turko-Bulgarian war there were 29 of complete destruction of both eyes, 17 unilateral. Sympathetic ophthalmia seems to be less frequent now than formerly.

**Terrien** presents a contribution, based upon a large experience of wounds of the eyelid and orbit in war. He discusses the advantages of the different kinds of flap which he has employed: sliding flap, flap with pedicle, and cutaneous and conjunctival grafts. He appears to favor pedunculated flaps from the immediate vicinity of the eyelids, whenever possible. But in cases of extensive wounds or cicatrices for which larger flaps are necessary, he has employed the Italian method and has taken a flap from the arm liberating it from the pedicle about the twelfth day. For total symblepharon he has employed skin grafts, taken from situations where the skin is thin, as the inner surface of the arm, or behind the ear; they should be free from subcutaneous cellular tissue. The adherent lid having been detached in its whole length and breadth from the orbital cavity (presumably where the globe has been destroyed), and a cul-de-sac constructed, the flap, measuring about one-quarter more than the prepared area, is very carefully sutured into place. The reporter has some fear of late shrinking of these flaps, and when possible prefers a pedicle flap from the temporal region.

**Morax** and **Désauges**, among 1,510 wounded soldiers, under their care from September, 1914, till 1917, observed 22 instances of traumatic lesions of the lacrimal passages—13 from rifle bullets and 9 from shells and torpedoes. The lesion may be caused by direct injury of the lacrimal passages with or without fracture of the lacrimal bone or superior maxilla or indirectly from secondary involvement due to fracture of the latter bone.

It is exceptional for the lacrimal lesion to occur alone; the presence of other disturbances or lesions almost invariably brings it about that involvement of the lacrimal passages is unrecognized or neglected at first. The latter shows itself only by slight watering. Subsequent infection calls attention to the injury. The frequency of infection is very great—19 out of 22. It consists of a dacryocystitis with or without abscess. The time of the occurrence of this complication is very inconstant—in these cases in from 1 to 18 months after the wound. Such tardy complications are comparable to what is sometimes observed in fractures of the bones of the face or of the base of the cranium when the sinuses are involved.

Treatment of these traumatic lesions and their complications is beset with great difficulty; it is almost always impossible to reestablish permeability of the canal; extirpation of the sac is the only measure to arrest suppuration. In spite of the best applied treatment relapses are frequent; this is particularly the case when the mucous membrane of the sac has been lacerated, and when there is no longer a single cavity, but a number of diverticuli. It is only by minute dissection of the canaliculi, of the different portions of the mucous lining of the sac and duct, as far as the stricture, that it is possible to succeed in arresting the source of these very disturbing suppurations, even where the globe has been enucleated.

**Kuhnt** writes that in cicatricial ectropion resulting from injury in war, the incision should be made if possible 1 cm. from the palpebral margin; cicatricial tissue should be entirely re-



moved. In the case of the lower lid the loss of substance should be covered by a pedicled flap from the temple, in the upper lid with a nonpedicled cutaneous flap. The pedicled flap should be carefully fixed in the central portion, so as to form a slight swelling above the level of the surrounding tissues. The writer gives special directions for fitting the extremity of the flap into the internal angle. Tarsal coloboma not over 1 cm. in width may be repaired by direct union. In case the entire width of the lid is involved, the anterior layer should be separated from the tarso-orbital fascia as far as the border of the orbit, and sutures placed in rows after displacing toward the nose the external flap, wherever there is considerable loss of substance.

In cicatrices adherent to the bone the cicatricial mass should be carefully removed, the palpebral border shortened and a fatty graft inserted, and the lid supported as far as possible by a suture. For restoration of the entire lid, Kuhnt adds to Fricke's method, flaps with two pedicles taken from the lid and cheek; in case of the upper lid he makes the transplantation from the lower one. In symblepharon, to cover the loss of bulbar tissue, he makes a

bridge shaped flap, or covers it with conjunctiva; in some cases, he takes conjunctiva from the other eye or a bit of mucous membrane from the mouth.

To replace the palpebral conjunctiva he takes a pedicled flap from the cheek, or skin from the lower lid, or buccal mucous membrane or conjunctiva from the other eye. In case of anophthalmia, he recommends May's procedure, but he also employs that of Czermak and Grunert. In cicatricial depression of the internal or external canthus, the lid is divided at the orbital margin, the periosteum stripped off for two or three mm. in area, the orbital contents brought forward and solidly fixed. Finally he gives directions for the closure of extensive naso-orbital openings, the restoration of loss of substance at the orbital margin, and the method of filling the cavity of the orbit.

Krusius describes his technic of dealing with the conjunctival plastic of the cornea, sclera; and a method of evisceration of the eyeball with retention of the cornea. The immediate results in the prevention of infection were excellent as well as for rendering the wounded man fit for transportation.

## GENERAL PATHOLOGY.

HANS BARKAN, M. D.

SAN FRANCISCO, CALIFORNIA.

This section notices general theoretic and experimental studies of the subject, covering the literature from January, 1917, to September, 1918.

**HEREDITY IN EYE CONDITIONS.**—Stören, Ewart and Howe have all published articles on the general subject of the influence sex, growth, and age of parent have on hereditary eye diseases, and on the transmission of the pigmentation of eyes. Stören examined the color of the eyes of individuals of the same sex in three consecutive generations. In 7 families in which both parents had brown eyes, 5 boys had blue, 17 boys had brown, 6 girls had blue, and 10 girls had brown eyes. In

families in which both parents had blue eyes, in quite a series of cases children with brown eyes were not infrequent, although in 1 case both parents and all 4 grandfathers and grandmothers had blue eyes. Stören concludes that there is no constant factor in any possible hereditary transmission of eye color.

Ewart has collected with great care a large number of statistics in an attempt to find a hereditary factor concerning eye color. In this relation the

influence of the age of the parent at the birth of the child was one of the factors studied. The material was collected in Middlesborough and consisted of females only. He selected as the standard the number of blue eyed in groups of different ages, and examined 1,000 eyes at birth finding the blue percentage 100. In the sixth year, of 387 the blue percentage was 54; at the ninth year, of 488 the blue was 41; between 15 and 29 of 80 examined the blue was 32, and between 31 and 40 of 543 examined the blue was 30 per cent.

The eyes of all infants are blue of varying shades at birth and change to other colors gradually. They change a little as late as the 20th to 30th year, and a distinct tendency of the eye to darken exists thruout life, irrespective of any factors that could be considered, that is, age of parent at birth, color of pigment of eyes, etc. The results of the examination, however, suggest that children born of young mothers tend to blue eyes; or at least that changes in the darker pigmentation dependent upon age are delayed in these children.

On the whole Ewart regards his results as purely negative, a number of his carefully worked out statistical series showing no association between the age of the parent at birth and the eye color of the adult. He concludes as far as the age of the parent at the birth of the child is concerned (1) that the average length of life of the offspring decreases; (2) the fertility of the offspring increases; (3) the offspring react less characteristically to zymotic infections; (4) the number of males born increases, and finally, that the intellectual grade of the offspring as defined by scholastic standards, rises.

Howe, in studying ocular muscles, has often noted that 3 or 4 persons in the same family show similar heterophorias, heterotropias, predisposition to ocular fatigue, etc. This has brought him to a study of the Mendelian law, of which he gives a very lucid explanation accompanied by a chart. He urges ophthalmologists to familiarize themselves with the simpler elements of the

law, as, for instance, the characteristics of inheritance; the terms "dominant" or "recessive" factors, claiming that in the study of certain ocular diseases, as for instance, retinitis pigmentosa, familial optic nerve atrophy, etc., the probability of the offspring being affected can be judged only by the ophthalmologist acquainted with the laws of Mendelian inheritance.

Howe raises a very interesting point in referring to another principle of heredity, namely, that of sex linkage, this being the tendency of certain characteristics to develop exclusively and predominantly in the male members of the family, as optic nerve atrophy, color blindness and night blindness. Howe urges the study of a few useful books among which he mentions Herbert's "Fundamental Principles of Heredity"; Castle's "Genetics and Eugenics"; and Davenport's "Heredity in Relation to Eugenics." The practical application of this knowledge in our specialty is stated by Howe to be illustrated by the advice we may be asked to give to persons desiring to marry, in whose family there may be a history of eye defects, such as coloboma of the iris, glaucoma, displaced lens, retinitis pigmentosa, optic nerve atrophy, etc.

**DEGENERATIVE CHANGES.** — Lewis draws attention to the ease and beauty with which ophthalmologists can see directly, and study at their leisure, pathologic changes, especially the advance of degenerative processes which occur before our very eyes. In support of his plea and in the course of an excellent review of the general subject of slow degenerative changes in the eyeball, he speaks of the formation of lime salts in an uninjured cornea and in an otherwise healthy eye, the author concluding that that particular part of the cornea had lost its vitality. In his case a solid lime deposit came away in the form of a perfect cast on probing underneath. Another interesting case quoted is that of calcareous degeneration in the deeper layers of the cornea; in which, during removal of cataract, the tissues grated during the incision as though filled with ashes. The cor-



nea was littered with small opaque spots in the deeper layers, and Lewis believes the condition to be allied to nodular opacity. Lewis proceeds to review briefly the occurrence in the eye of calcareous and osseous degenerative processes so often seen in the degenerated eyeball at microscopic examination. After an interesting discussion regarding the biology of the cell from a broad point of view, Lewis takes the physiologic chemical point of view in regarding the complexity of the degenerative changes as being the logical retrograde processes, just as in the upbuilding the complexity of these processes is as great.

**CICATRICAL CHANGES.**—**Steyn's** paper deals with an anatomic description of cicatricial changes of the eye, especially the development of the trachomatous entropion, the occlusion of the angle of the anterior chamber and the ectropion of the pigment layer of the iris in glaucoma; and ends with a critic of the observations of Schnabel regarding the glaucomatous caverns of the optic nerve. He finally presents a theory of his own concerning the causation of retinal detachment.

**CHOLESTERIN IN THE EYE.**—**Vuse** fed rabbits with cholesterin and olive oil, the rabbits developing a high grade permanent lipemia. Very early, before any opalescence of serum takes place, an opaque ring is formed about the corneal margin, resembling in every particular the arcus senilis of the human. The ring is independent of any vascular changes and is solely an infiltration of the cornea with cholesterin fat mixtures. **Albarenque** finds the deposit of cholesterin in the eye is favored by the normal supply of this substance to the organ, the nutrition of the media dependent on the osmotic circulation, and their passive function. He traces the effects of these conditions in arcus senilis, cataract, retinitis, and xanthelasma.

**INFLUENCE OF X-RAY.**—**Pagenstecher** has investigated the question of retinal rosettes, and has shown that when pregnant rabbits were irradiated typical rosettes could afterward be demonstrated in the retina of the living fe-

tus. X-rays can therefore produce congenital rosettes of the retina in certain animals. [The reviewer speculates as to whether the rosettes found by Lilienfeld in the human embryo eyes in Axenfeld's and Fuchs' clinics, described as misplaced embryonic retinal elements and as the starting point of glioma, may not have been obtained from children whose mothers were subjected to abdominal X-ray exposure. This point has never been stated in the publication of these cases.—H. B.]

**DIFFERENTIATION OF DIPLOBACILLI.**—**Scarlett** gives the histories of two cases of corneal ulceration due to two diplobacilli resembling morphologically the *Morax diplobacillus* and the *diplobacillus* of Petit, but differing in cultural and staining characteristics. One of these Scarlett has named *diplobacillus nonliquefaciens*, as it does not liquify agar or coagulate serum. This organism causes a severe painful ulcer with hypopyon. The second organism was distinguished from other members of the group by being gram positive. A table is appended showing the characteristics of these organisms in smear and culture.

**CHEMISTRY OF OCULAR PIGMENT.**—**Lo Cascio** by painstaking chemical researches presents the chemical constituents of the choroid of the ox, stating that it contains carbon and nitrogen, and sulphur as high as 1.77 per cent, iron in 0.10 per cent which may come from a trace of blood, phosphorus in 0.24 per cent, oleaginous substances, butyric acid and xilitone. Of chief interest is his statement that the retinal pigment does not differ in its chemie composition from the choroid pigment; and that the human choroid pigment does not differ from that of the ox.

**ANAPHYLAXIS.**—An editorial in the *New York Medical Journal*, vol. 106, p. 1187, on ocular anaphylaxis, takes up briefly the main theories of sympathetic ophthalmia, stating that the explanation accepted by most observers today is that the condition is an anaphylactic uveitis. A short and clear explanation of the theory of the anaphylactic process is then given; namely, that the disintegrating uvea in



the exciting eye is reabsorbed as antigen, and leads to a hypersensitization of homologous tissue, namely uvea of the second eye. Absorption beyond this point becomes intoxication and is manifested clinically by the well known inflammatory signs. See O. Y. B., v. 13, p. 367.

**Woods**, in a second contribution on the same subject of ocular anaphylaxis discusses the theories held, up to the present; the mycotic theory, the bacterial origin, both of which he discards, and then refers to the cytotoxic theory of Golowin. This theory first brought the subject into the serologic state; and Elschmig, whose first work appeared in 1910, enunciated the theory of the anaphylactic origin of sympathetic ophthalmia with a report of his experimental work. There follows a clear and minute description of Elschmig's work and that of Fuchs, Meller and von Szily; all of whom worked along these lines, altho in many ways their view has been that of skepticism regarding the antigen properties of chemically pure uveal pigment.

The work undertaken by Woods has been with the idea of simulating as closely as possible the conditions under which sympathetic ophthalmia occurs clinically, and to this end the eyes of sensitized animals were perfused with specific antigens. The plan of work has been to determine the following points: (1) the antigenic properties of homologous uvea; (2) the ability of one eye to react to perfusion in animals previously sensitized by intraocular injection of the other eye; (3) the constituent of the uveal tract responsible for such antigenic properties as are possessed by the homologous uvea. The technic of the experiments is too detailed to be reviewed, but the discussion in Woods' paper leads to the following conclusions: (1) Homologous uvea has the power of acting as antigen and producing an ocular hypersensitiveness: (2) Homologous uvea possesses a strong organ specificity: (3) Intraocular injection of a small amount of either homologous or heterologous uveal emulsion can

produce a hypersensitiveness in the second eye. (4) It seems probable that the peculiar antigen properties of uveal emulsions are due to the pigment epithelium.

**ACCIDENTAL SOMATIC CHANGES.**—**Landolt** engages in a discussion and presentation of some letters between Donders and Brown-Sequard of a rather amusing character. It seems that Brown-Sequard in section of the restiform body in guinea pigs noted opacity of the cornea and lens in the descendants of these, as well as changes in the vitreous and aqueous consisting of white or rose colored flakes. Donders in a letter to Brown-Sequard questions the effect of the section of the restiform body; and explains the eye lesions found in these lively little animals as the result of the guinea pig running about in the cage, fighting with his neighbor and thereby injuring his eye, and also asks whether Brown-Sequard acted as the accoucheur of the guinea pigs and could be positive that they were really born with these defects. Brown-Sequard in answer stated that all of these lesions came from one pair of guinea pigs that had been operated upon. With our present knowledge of heredity, eye defects and close mating in the production of a chain of eye defects, it appears probable to the reviewer that section of the restiform body in this particular pair of guinea pigs had no influence on the ocular defects of their descendants.

**EYE OF THE NEGRO.**—**Kollock** has had an experience of over 30 years with the eye of the negro, and 23 years ago published his first paper on the defects of the eye peculiar to this race. In his experience syphilis is responsible for the great majority of all ocular lesions of negroes. For instance, 45% of all ocular nerve lesions consist of primary optic nerve atrophy. He wonders at the present date whether, or no, the adulteration of the cheap liquor used with wood alcohol may not be responsible for a good many of these atrophies.

In general, negroes are relatively immune to chronic inflammations of the conjunctiva, particularly to trachoma.

The latter, curiously enough, has never occurred in an epidemic form, in spite of the dirty surroundings of the average southern negro. Cataract and glaucoma are said to be about as prevalent in the negro as in the white. Kollock here refers to the improbability of eye strain as a factor in the production of cataract, as of the negroes he has seen during these years the majority do not read.

As regards refraction he finds very few myopes, although the highest grade myopia, a man of 26 D, happened to be a negro. A short discussion follows on the effect of civilization in the production of myopia in which discussion Kollock quotes the remarks of St. John Roosa and S. D. Risley on this subject. Only one case of uncomplicated strabismus in the pure negro has been observed by the author. Kollock concludes that the eye of the pure blooded negro is, with one exception, and that the increase of myopia, practically in the same condition as in his first report of 1892.

**EYES OF RETARDED CHILDREN.**—**Barkan** divides the mentally retarded children in whom ocular defects are found into two clinical groups: (1) those whose retardation is due to physical handicap which can be removed,—tonsils, adenoids, high grade myopia, or other marked errors of refraction; (2) those where in the absence of any marked general or local physical faults, a certain degree of mental retardation is present; evidenced often not only by negative inability to learn as others of the same age do, but also by positive traits. These children are unruly, disorderly, disobedient, petty thieves, constant truants from school, and confirmed liars.

In this second class of which he particularly speaks, he states that the visual tests display as the most common abnormality a marked difference in vision of the two eyes, or low vision in both equally; the first being slightly

the more frequent. Muscular balance tests seldom even approximate the normal, but show marked degrees of exophoria or esophoria, usually the former. By far the great majority are hypermetropic and also markedly astigmatic, a very small number are myopic.

Barkan finds that the vision of a certain number cannot be improved by proper glasses, and in these the fundus usually shows one of the following 5 pictures: (1) Fundus without or with very little pigment. (2) Excessively hyperemic discs, margins not distinguishable, veins dark and dilated. (3) Veins and arteries, normal in caliber, forming many small curves in their course over the fundus. (4) Discs of normal color and outline, but vessels branching off fan-shape, ("sprawling" off the disc is the descriptive phrase most applicable). (5) Excessively pale discs, vessels of normal size. Barkan does not find anatomic congenital malformations, such as coloboma of the iris and choroid, dermoids of the conjunctiva, epicanthus, microphthalmus, aniridia, etc., more frequent among these children than among mentally normal ones; but they are more frequent in idiots and imbeciles than in mentally normal children.

A certain relation between ocular defects and the general appearance of the children is striking. They form a group distinguished by being shorter, thinner, sallow and less active physically than their companions; but exceptions, of course, occur frequently. In conclusion, he urges thoro ocular examinations of mentally retarded children, stating that a small number will be remarkably improved by proper glasses. In those not amenable to visual improvement, we obtain by examination an index of the kind of work they may be expected to do in the future, as far as their vision is a factor; and can proceed to educate them accordingly.



## GENERAL DISEASES.

EDWARD JACKSON, M. D., F. A. C. S.

DENVER, COLO.

Many references to general diseases will be found in the sections of the Digest referring to the parts of the eye affected. Only papers of such general character as not to fall appropriately to either of those sections are here considered. The literature here covered extends from January, 1917, to October, 1918.

**MEASLES.**—**Bahn** believes that the catarrhal conjunctivitis which appears with an attack of measles is essentially similar to the catarrhal process in the respiratory tract; and depends upon the virulence of the measles contagion, plus the secondary infections by the ordinary pyogenic organisms. The treatment should be directed to the latter, as ethylhydrocuprein for the pneumococcus infection, or zinc for the Morax-Axenfeld bacillus. The ulcerative marginal blepharitis and chalazia, frequently following measles, may require treatment.

**SCARLET FEVER.**—In an epidemic of 2,000 cases of scarlet fever with 200 deaths **Giuseppi** saw 4 cases of corneal ulcer, 2 of iritis, and 4 of panophthalmitis, which all developed during the course of the disease. One case of corneal ulcer was fatal on the twelfth day, another that developed on the eighth day left the patient blind. One eye affected with iritis had to be enucleated. All of the cases of panophthalmitis were fatal and all ran an acute course. Bilateral *mydriasis* with ocular hyperemia was noted as always being followed by death within 48 hours. This was true even of patients who seemed not very sick when the *mydriasis* appeared. **Giuseppi** suggests that this symptom was caused by a severe toxic action on the adrenals and sympathetic nervous system.

**ANTITYPHOID VACCINATION.**—Numerous cases of ocular disease following antityphoid vaccination have been reported. But most of them seem to have had some other causative factor. **Ginestous** found that one man who complained of impaired vision suffered from a preexisting albuminuric retinitis, and another from tobacco amblyopia. In a third case bilateral kerato-

conjunctivitis developed two days after a fourth injection. It was followed by miliary abscesses in the right cornea, and ulceration of the left cornea with perforation. The right eye recovered full vision but the left had a central leucoma. In this case a febrile herpes, accompanying the temperature reaction, may have been due to the vaccination.

**Calhoun** saw two cases; one of iritis arising one or two days after his first antityphoid and paratyphoid inoculation. The iritis cleared up in about one month leaving full vision. The patient had previously suffered a gonococcus infection. The second patient developed blurred sight with corneal deposits, vitreous opacities and choroiditis a few days after his third inoculation. He had a 4 plus Wassermann. On account of the possible influence of the vaccination in exciting trouble **Lapersonne** urges that it should not be practiced on persons who have suffered from syphilis, arthritis, or tuberculosis.

The eye affections that occur in typhoid and paratyphoid fever **Gilbert** finds include supraorbital neuralgia, which he also saw after antityphoid vaccinations. He reported two cases of metastatic iridocyclitis occurring with paratyphoid.

**INFECTIVE JAUNDICE.**—The work of Japanese investigators tracing this disease (often called Weil's disease) to an organism which they call *spirocheta ictero hemorrhagica*, and for which **Noguchi** has suggested the name *lepidospira*, has led to its general recognition on the battle fronts of Europe; and the study of the ocular lesions which frequently accompany it. **Moret** found during the earlier stages, congestion involving the conjunctiva,



uveal tract, retina and optic nerve, often attended with hemorrhages. Among 30 severe cases of this disease he encountered two cases of true iritis.

**Weekers and Firket** among 50 cases found only four free from ocular symptoms. But these symptoms were in 29 cases only hyperemia of the anterior segment, in 7 congestion of the iris, and in 6 iritis. In 3 cases iritis accompanied optic neuritis and in one there was herpes. They point out that the chief eye symptoms do not arise during the acute febrile stage, but after the appearance of the jaundice and the second febrile reaction ten days to two weeks from the beginning of the attack.

**Hertel** observed corneal lesions in which he found the organism, and notes that panophthalmitis may occur. He experimented with rabbits and marmots, causing infections fatal in 7 to 9 days. The eye lesions occurred whether the animal was inoculated through the anterior chamber or in the peritoneum; spirochetes being found in the conjunctival secretions three days after intraperitoneal inoculation.

**THE PLAGUE.**—**Youidine** has studied 19 eyes of 15 persons dying of the plague, most of them being removed within two or three hours after death. The principal lesions were in the posterior segment, the inflammation of the ciliary body, iris and cornea appeared to be due to extensions forward of the uveal inflammatory process. The choroidal veins and capillaries were most dilated posteriorly. In all the eyes the retina was separated from the choroid by exudate. The bacillus pestis was not found indicating that the ocular lesions were due to toxins.

**CEREBROSPINAL MENINGITIS.**—**Lavagna** reports the case of a young man aged 23, who 11 months after an attack of cerebrospinal meningitis presented himself with purulent conjunctivitis, iritis, with posterior synechiae, diminished vision and contraction of the visual field in the right eye. The ophthalmoscope showed a focus of chorioretinitis with optic neuritis. Subsequently he suffered from detachment

of the retina still farther limiting his field of vision. These symptoms are ascribed to recurrent infection. The left eye remained normal throughout.

**Epidemic Encephalitis.**—Under various names there have been reported from Great Britain and France several series of cases of obscure etiology in which extreme ophthalmoplegia, ptosis, and nystagmus are among the most definite and constant symptoms. **Morax** reported on a series studied in the hospitals of Paris under the name "lethargic encephalitis." He found about one-fourth of the cases fatal. In the ophthalmoplegia the accommodation and iris movements are impaired in exceptional cases; generally only the external muscles suffer. **Hall**, of Sheffield, England, saw ten cases in a month, and entitled it "an epidemic of toxic ophthalmoplegia." The *Lancet*, (April 20, 1918, p. 580) promptly labeled it "botulism" poisoning, probably due to *Bacillus botulinus*.

**Dobson** reported one case, and **McCaw, Perdrau and Stebbing**, and **Duncan** seven cases from London, as "toxic bulbar paralysis, possibly botulism"; while **Buzzard** reporting another case called it a "toxic encephalitis." **Mel-land** reports his 13 cases occurring within 6 months under the title "epidemic poli-encephalitis." In two there was marked optic neuritis, but in some cases the symptoms of ophthalmoplegia were slight or even entirely absent. **Kinnier Wilson's** seven cases are reported under the title "epidemic encephalitis," a name appropriate to a view of the disease which he supports by two necropsies. The bacillus botulinus has not been recognized; nor has any particular article of food been found to carry the poison. Among the 39 British cases there appear to have been eight deaths.

**MISCELLANEOUS INFECTIONS.**—The occurrence of iritis and cyclitis as a complication or sequel of *dysentery* is reported by **Maxwell and Keip**. The six cases seen by them were probably all of the bacillary type although one was doubtful. The ocular lesions appeared about one month after the first sign of bowel involvement. The im-

mediate prognosis of such cases is favorable, but the danger of subsequent relapses is still unknown. Three of the cases were accompanied by arthritis. **Fiessinger** and **Leroy** also noticed the association of iritis with arthritis. **Pacheco Luna** (A. J. O., v. 1, p. 658) recorded a case of acute iritis after amebic dysentery. It resisted the ordinary treatment for several weeks, but quickly recovered under injections of emetin hydrochlorid, coincident with the disappearance of the entameba from the discharges.

A case of **Vincent's infection**, exhibiting severe conjunctivitis and photophobia, along with lesions of the mouth and other parts of the body, is reported by **Bowman**. The conjunctival discharge contained flakes of whitish material.

A case of monocular optic neuritis following *pneumonia* is reported by **Tenner**. The trouble was chiefly retrolbulbar, but showed in blurring of the optic disc. Full vision was recovered after an absolute central scotoma. The ocular lesions of diphtheria are discussed by **Giuseppi**, who encountered but five cases among 5000 diphtheria patients. In one child the disease began in the conjunctiva. Both eyes presented diphtheria membranes, while other children in the family were attacked in the throat. All his cases yielded promptly to antitoxin treatment. He points out that the prognosis as to oculomotor palsies should be guarded, as the nucleus may be merely injured temporarily, or it may be destroyed by the toxin.

**GONOCOCCUS INFECTION.**—It was suggested that a statement "that 50 percent of blindness is due to venereal disease is an unwarranted reflection on the blind." **Traquair** replied, by reference to statistics; "more than 50 percent of the cases are due to such diseases in childhood." It may be admitted that later in life ophthalmia neonatorum causes no more cases, while other diseases and accident furnish an increasing proportion. Yet syphilis also furnishes an increasing number of blind eyes through iritis, optic atrophy, glaucoma, etc. While the proportion

varies at different ages, 50 percent may not be far wrong for the whole community. Each case of ophthalmia neonatorum furnishes more than the average number of years of blindness.

The practice in Glasgow of bringing mothers into the infirmary with infants who are to be treated for ophthalmia neonatorum has revealed important facts regarding blindness from this disease. **Chalmers** finds that such ophthalmia has occurred in successive children in several families; and also that the danger of blindness is much greater when congenital syphilis co-exists with ophthalmia neonatorum. During treatment of 227 babies with nongonorrheal ophthalmia one became blind; and of 151 babies with gonococcal ophthalmia one became blind. But of 42 suffering from both gonorrheal infection and syphilis 2 became totally blind. While 98 percent of the nongonococcal, and 87 percent of the gonococcal disease, were completely cured, only 42 percent of those with both syphilis and gonococcus infection were so cured.

With regard to the effects of notification of ophthalmia neonatorum the opinions expressed before the Commission on Venereal Diseases (British Journal of Ophth. v. 1, p. 390) varied widely. Mr. Cross thought it might be stamped out entirely. Mr. Jessop did not think it had helped much to reduce the number of cases. Mr. Harman found it served two useful purposes: it made medical men and midwives more careful, and it rendered early treatment more likely.

**SYPHILIS.**—In the above report regarding the frequency of syphilis as a cause of ocular disease **Jessop** gave the following figures as to the proportion of positive Wassermanns with certain ocular diseases: In iritis 45 percent, choroiditis 29 percent, interstitial keratitis 52 percent, primary optic atrophy 35 percent. **Brinkerhoff** in his report on 500 Wassermann reactions in patients with ocular disease, at Wills Eye Hospital, gives the positive results as: Iritis 46 percent, choroiditis 35 percent, interstitial keratitis 62 percent, and atrophy of the optic nerve 40 percent.



In estimating the significance of such figures one must bear in mind the proportion of persons in the whole community who have a positive Wassermann reaction. Such common percentage would be found for each of these diseases, even if syphilis had nothing to do with their etiology.

The work of **Sunseri** with the Porges' reaction to syphilis (the mixing of sodium glycocholal with the suspected serum) seems to indicate its value. In two cases of initial syphiloma it was positive when the Wassermann was negative. In the 80 cases of ocular disease it yielded 21 positive and 3 doubtful, against 19 positive and 2 doubtful with the Wassermann. The three cases doubtful with the Porges were positive with the Wassermann, and all recovered under specific treatment. In 22 cases of other conditions the Porges reaction was negative in all except one, a case of Malta fever.

The statistics of **Collins** regarding nervous manifestations of 790 cases of syphilis of the eye, have been referred to in the *Journal*, vol. 1, page 685. In general the different symptoms follow this order of numerical frequency: (1) Disorder of size, shape and contour of pupils; (2) Loss of light reflex; (3) History of diplopia; (4) Changes in the optic nerve. The frequency of involvement is greatest in the third nerve, next in the sixth and last in the fourth.

In discussing syphilis of the nervous system **Spiller** includes tabetic ocular palsies, and thinks the lesion in both these and the recognized syphilitic ocular palsies is not primarily nuclear, but it is in the nerve fibres as they leave the brain. He has reported cases of lymphocytic infiltration of the ocular nerve and believes most of these palsies are primarily in the nerve roots and not nuclear. This is in harmony with the observations that such palsies disappear or tend to recur. A case of bilateral amaurosis with syphilitic meningitis reported by **Charlin** is ascribed to lymphocytic infiltration in the region of the optic foramina. **Wieden** has reported a case of syphilitic chorioretinitis and optic atrophy in

which improvement of vision and fields followed injections of neosalvarsan.

**Seelert** reports a case of cerebral syphilis in which, with pathologic sensations in other parts of the body, he was tormented by "seeing" remembered objects, although they did not amount to hallucinations.

**Charles**, in a study of the teeth in the congenitally blind, finds that when one of the central incisors appears notched and the other normal, transillumination, by placing the light in the mouth behind them, may bring out defects in the enamel of the apparently normal teeth. Occasionally when there is no notching of either tooth that would ever otherwise have been called Hutchinson teeth, they may show areas of deficient enamel, or may be traversed by alternating lines of normal and deficient enamel. In one of these cases, a boy ten years old, congenitally blind with one notched tooth, was found to have the other defective. His blood Wassermann was positive and spinal fluid negative.

In the discussion opened by **Lawford** in the treatment of syphilis, he reported striking benefit from the newer remedies, salvarsan, etc., in iritis and in the primary lesions. In the oculomotor paralyzes these drugs had not proved markedly superior to mercury. In cycloplegia and iridoplegia they were worthy of trial in connection with mercury and iodides. In miosis and loss of light reflex and primary optic atrophy little benefit could be expected.

With regard to the interstitial keratitis of congenital syphilis the evidence varied widely and no conclusion could be reached; altho there seemed to be agreement that a single dose was of no value, but that repeated doses might be more effective. With regard to the unfavorable effects he thought there could be no doubt that the damage sometimes done to the optic nerve or oculomotor nerves must be ascribed to the drug, even though such lesions were sometimes cured by continuation of its use or by mercury. They are undoubtedly syphilitic, but are precipi-



tated by the administration of salvarsan.

**Browning** regards kharsivan and arsenobenzol as equivalents of salvarsan, and neokharsivan and novarsenobenzol as equivalent to neosalvarsan. In the discussion Harrison reported from an experience of 8,000 injections of kharsivan, 16,000 of salvarsan, and 20,000 of arsenobenzol that he had not been able to discover any practical difference between them. Some samples of kharsivan and arsenobenzol were less soluble than others; and these were followed by a larger proportion of immediate reactions.

He had large experience with a course consisting of three full doses of salvarsan and ten injections of mercury, the whole lasting ten weeks. But this still permitted about 30 per cent of relapses within the year. More vigorous treatment, as 8 injections of salvarsan, 0.3 gram, and 8 of mercury, promised better results. The deaths that occur commonly follow the later injections of a series given at intervals of less than 2 weeks. Also in discussion Lawson pointed out that where antisiphilic treatment proved ineffective tuberculosis should be suspected and looked for. He believed the mixed infection was very unfavorable, and other speakers emphasized the importance of this mixed infection.

The importance of examining the eye with the ophthalmoscope in every case, before giving injections of arsenobenzol is emphasized by **Blanco**; as a means of guarding against the nerve lesions, the so-called neurorecidives. Only when the optic nerve is free from lesions and the vitreous clear of dust-like opacities should these remedies be given. **Maucione** makes a comparison of results obtained with neosalvarsan with those following the use of mercury and the iodides, which is favorable to the former. He gives 30 to 60 centigrams at intervals of 5 to 15 days.

In view of the dangers of the newer arsenic preparations **Abadie** urges the importance of prolonged mercurial treatment, especially by intravenous injections of mercury cyanid. They can be given every two days. For

optic atrophy or chorioretinitis he used 10 or 12 such injections, repeated after a few months. If then the condition improves, treatment is persisted in until 30 or 40 injections have been given. Persistent use of inunctions is also approved.

In the treatment of syphilitic and parasymphilic affections of the optic nerves **Schoenberg** has urged the injection of remedies into the cerebral ventricles; arguing, from the beneficial result of intraspinal injections in spinal syphilis, that such a direct attack on the lesion was likely to prove effective and to prevent blindness. He has demonstrated by experiment that the intraspinal injections cannot reach the optic nerve; but it is reached by injections through the lateral ventricles. He was thus able to produce staining of the nerve during life.

**Gendron** reports that *galyl* is an efficient antisymphilic remedy in doses that may be smaller than those of salvarsan, 0.15 to 0.20 grams, which can be repeated several days in succession, and that the mixed galyl and mercury treatment is efficacious and well borne. **Richard** finds galyl not inferior in antisymphilic power to the other arsenic derivatives now commonly employed, and safe if properly used. It can be given by intravenous injection in doses of 0.2 gram. and at intervals of 4 days, and can be given in conjunction with mercurials. It seems better tolerated than salvarsan. He has seen a serious local lesion from escape of the drug into the cellular tissue. The general reaction, when it occurs, comes on in five or six hours, and lasts two or three hours. There is slight rise of temperature, malaise, headache, and vomiting. In 220 injections no renal disturbance was noted. **Akatzuka** has written on injections of sublimat, and on salvarsan and neosalvarsan for ocular syphilis.

**SPOROTRICHOSIS.**—The danger of confusing sporotrichosis with syphilis is illustrated by **Leoz**, in referring to a case in which vigorous antisymphilic treatment failed to avert a fatal result. His two other cases were also treated for syphilis, before the proper diagnosis

had been arrived at. One had suffered 4 or 5 years, and had multiple destructive lesions of the cornea, conjunctiva and sclera. The Wassermann was negative. Large doses of potassium iodid, with ignipuncture of the lesions, were followed by complete cure.

In his third case, suffering from nodular infiltrations of the cornea, growing worse under mercury and iodid, with crater-shaped ulcerations surmounting fleshy elevations, and with swelling of the submaxillary glands, instillations of dionin, and potassium iodid, in large doses to the limit of toleration, produced a cure in 11 days. But when the patient had discontinued the drug four days, a small growth had reappeared and these multiplied rapidly. After this recurrence prolonged treatment was required, because of hypersensibility to the iodid; and the drug had to be injected into the lesions, in 5 per cent watery solution, with acoin. The sporotricum was demonstrated in cultures made from the fluid obtained by incising one of the tumors.

**STREPTOTHRIX INFECTION.**—In the case reported by **Sobhy** the lesions were grayish yellow waxy masses under the bulbar conjunctiva, in wavy lines running from the limbus toward the inner canthus. Under the microscope the ray fungus was shown. It had clubbed ends like the actinomyces.

**TUBERCULOSIS.**—In ocular tuberculosis the general symptoms are mostly lacking. Observed by ordinary methods the temperature curve throws no light on the case. **Smith**, however, insists that it is the one fixed factor in recognizing tuberculous fundus lesions. The daily range may be slight and is likely to include subnormal morning temperature, sometimes not rising quite to the normal average in the afternoon. But it is a range greater than that of health. He holds that in fundus lesions tuberculin for diagnostic purposes is useless if the ophthalmoscope does not show a focal reaction, and that doses should be regulated by the ophthalmoscopic changes. In the discussion Meader confirmed the view that a tendency to subnormal temperature is

significant, especially when this is brought about by exercise or fatigue.

In writing of the bacteriologic diagnosis of ocular tuberculosis, **Poyales** calls attention to the fact that exposure of the guinea-pig to X-rays increases its susceptibility to the tubercle bacillus. This can shorten the time required for the bacteriologic test by inoculation; and renders it more sensitive, a matter of importance where the bacilli are so scarce, and attenuated as they often are in ocular lesions. He reports 7 cases including lacrimal fistula, sclerosing keratitis, tuberculous retinitis, tuberculous ulcer of the lid, iritis, choroiditis, and osteomyelitis with fistula of the upper lid, in each of which the bacillus was secured by staining or cultural inoculations. **Shiosi** reports a clinical and histologic study of ocular tuberculosis by experiments on animals.

To the ocular lesions of tuberculosis **von Hippel** contributes 3 cases. One of proliferating uveitis with detachment of the retina, occurred in a boy of 13. One was of tuberculous disease of the lens in a woman of 40, whose right eye was injured in childhood; who 4 years before had presented foci of the disease near the optic nerve, and now came, with a blind hyperemic uncomfortable eye for enucleation. The lens was entirely opaque and enclosed in a thin layer of typical tuberculous granulation tissue. The inflammatory round cells, and this tissue had broken through the anterior capsule. The third case was one of tuberculous corneal marginal ulcer, in a woman aged 42, coincident with tuberculous lymphoma of the axilla.

As illustrating the clinical appearances of a tuberculous condition of the optic nerve **Cramer** reported the case of a woman of 22, who presented a snow-white, or porcelain-white tongue shaped clouding of the retina, at the upper margin of the optic nerve, like opaque nerve fibres. Four days later this exudate showed marked swelling and extended on to the optic nerve head, in a yellowish red branch of tissue, hiding the central retinal vessels. Tuberculin injection produced local



and general reactions with severe pain in the eyes. Under local treatment with smallest doses of bacillus emulsion, the eye at the end of a year presented full central vision, a slightly restricted field, and somewhat reddened appearance of the optic disc that had been noted a month after treatment began.

Tuberculosis of the anterior segment of the eye is reported by **Zentmayer** in a woman of 32. The cornea presented a tongue-shaped area of superficial vascular haze. The pupils were irregular from synechiae, fibrinous exudate on the anterior capsule, and mutton-fat drops on Descemet's membrane. Both eyes were affected.

**Fernandez** points out that ocular tuberculosis is secondary, but usually the primary focus is latent, and that the ocular lesions rarely accompany pulmonary tuberculosis.

**Metz** reports a group of ten cases, including scleritis, sclerosing keratitis, and sclerochoroiditis, in which tuberculosis was definitely present in eight. The seven in which general reaction followed the diagnostic use of tuberculin showed negative physical findings. Of 9 reactions 8 were general and one focal. Tuberculin therapy employed in 5 cases secured apparent cure or marked improvement. **Nogawa** writes on superficial nodules in parenchymatous keratitis with tuberculosis. **Brose** concludes that tuberculin is more valuable as a diagnostic agent than as a curative one. It is proper to administer it therapeutically, but one must not expect production of antibodies such as occurs with typhoid serum. **Pierson** makes a plea for the more frequent diagnostic use of tuberculin.

**Verheyden** regards strumous keratitis as a form of localized tuberculosis, amenable to general treatment, but shortened by the use of tuberculin. In scleritis and episcleritis the specific treatment may prevent deeper involvement of the eyeball. In uveal inflammation he finds a field for tuberculin treatment, and in central tuberculous choroiditis and tuberculous paralysis of the third nerve, he reports good results.

Old tuberculin was used throughout. No injection given when the temperature was increased; and no increase of dose when mild focal reaction had occurred. **Faith** reports 4 cases of ocular tuberculosis, sclerokeratitis, choroiditis, and optic neuritis treated with tuberculin. He draws from these the lesson that the dose must not be too rapidly increased or too soon repeated.

**LEPROSY.**—As pointed out by **Cuevas Pulido**, in presenting a case before the Ophthalmological Society of Madrid, this disease so generally affects the eyes that cases frequently are first to be recognized when they apply for relief from ocular lesions. This fact gives importance to a general review and bibliography of the subject like that of **Yudkin** (*A. J. O.* v. 1. p. 303) whose two cases showed thickening of the lids with nodules, and one of them areas of anesthesia, and a lesion of the limbus and cornea.

The so-called symptom of **Hernando** is discussed by **Marquez**, who points out that this upward rolling of the eyeball, when it becomes impossible to entirely close the palpebral fissure, is essentially the symptom described by Bell in connection with facial paralysis; and closely related to the resistance to eversion of the lid, pointed out by Gifford, as a sign of exophthalmic goiter.

**Valettas**, resorting to the expedient of pressure on the sclera to bring the region of the ora serrata into the ophthalmoscopic field, discovered there, in two cases of leprosy, shining spots on a dark, pigmented background. This, he thinks, a rather early lesion in eyes becoming affected with leprosy. In these cases there was superficial keratitis and episcleritis; but the deeper parts of the fundus had not been invaded.

**POLYCYTHEMIA.**—The case of a woman aged 38 is reported by **Patterson**. She had been out of health eight months; hemoglobin 120 percent; blood count 8,896,000. Vision had been impaired for two weeks. The veins were almost black in color, slightly enlarged and wavy. In the right eye were a great increase of vessels on the optic disc, many retinal hemorrhages, a



white patch the same diameter as the disc, and another smaller one in the nasal retina. In the fovea was noted the appearance of a droplet of blood, and elsewhere many droplets of exudate.

**Cohen's** patient showed hemoglobin 140 to 160 percent, and blood count 8,000,000 to 10,000,000 red cells. Thrombosis of the central retinal vein had occurred in the right eye, and it was entirely blind. Here, too, there was increase in the arteries on and near the disc; and in both eyes some evidence of arteriosclerosis. This patient had a strongly positive Wassermann reaction. Of **Christian's** ten cases one died of thrombosis of the portal vein, and two of thrombosis of the cerebral arteries; three complained of disturbance of vision, but no account is given of ophthalmoscopic appearances.

**LEUKEMIA.**—**Cohen** reports the case of a woman aged 23, with hemoglobin 45 percent; red cell count 1,800,000; leucocytes 300,000 to 500,000, with 43 percent of polynuclears. The patient died of pneumonia. The ophthalmoscopic picture was a light fundus, disc dirty-white, blurred, and elevated above the surrounding retina. Retinal veins tortuous, dilated, dark red, arteries slightly tortuous. One retinal hemorrhage. On microscopic examination the choroidal veins were found dilated; which **Cohen** thinks an early manifestation of choroiditis. He concludes that in sphenomyelogenous leukemia the ocular changes are analogous to those in other parts of the body. **Kümmell** gives a review of the German literature of ocular changes in leukemia, but makes from it no important deductions.

**INTERNAL SECRETIONS.**—The physiologic importance of the internal secretions in keeping up and regulating the nutrition of the different tissues, justifies the belief that they have an important influence on such highly organized tissues as are represented in the eye. The practical application of this hypothesis to retinitis pigmentosa has been mentioned by **Jones** (*A. J. O.*, v. 1, p. 113).

In addition general papers upon the subject have been published by **Zent-**

**mayer, Spencer, Schirmer, and Lamb.** The first two of these give general reviews of our knowledge of the subject, upon which new observations should be based. **Lamb** attempts to connect alteration in these secretions with general manifestations of nerve disturbance in the eye, especially with glaucoma. **Sewall**, in discussing **Spencer's** paper, points out that there appears to be no important specific action of any internal secretion upon the eye, in the sense that atropin is a mydriatic or eserine a miotic. But the general action of these secretions must have a profound influence on the eye as a part of the organic whole. **Daland** has written on the relation of the ductless glands to arterial disease.

**EXOPHTHALMIC GOITER.**—The view that this disease is primarily due to the influence of a focal infection upon the thyroid gland is advocated by **Dunn**, who reports 4 cases in support of it. One is the case of a woman of 26, who with infection and abscess of the left lower eyelid showed marked enlargement of the thyroid, and symptoms of acute over secretion. The lid abscess was opened and silver nitrate applied to the cavity. A mercurial was ordered and in less than a week the thyroid enlargement and symptoms of hyperthyroidism had disappeared.

The second patient, a woman of 36, had an enlarged soft thyroid, attacks of increased pulse rate, and abnormal nervousness. Both tonsils had diseased crypts. Enucleation of the tonsils, without other treatment, was followed by marked reduction in the size of the thyroid, disappearance of symptoms due to hypersecretion, and recession of the eyeballs.

In the third case, a woman of 50, with hyperthyroidism and enlarged neck, had diseased tonsils. The enlargement of the thyroid had come on with an abscess in the throat four years before. The fourth patient, a man aged 28, had Basedow's disease of three or four years' standing. A high degree of exophthalmos, with marked Graefe symptom and large bulging thyroid and high pulse rate. Both tonsils were diseased. Three months after their re-

moval exophthalmos had disappeared, the thyroid was not noticeable on careful inspection, and he felt well; altho he still had easily excitable pulse, and later some enlargement of the thyroid. This tendency, Dunn thinks, indicated a remaining focal infection somewhere in the body. (See also p. 176 and above section on Internal Secretions).

**NUTRITION.**—From his study of *eczematous ophthalmia (phlyctenular disease)* **Goldenburg** concludes that it is, in all probability, an expression of vagus system irritability, produced by some toxic agent resulting from faulty carbohydrate chemism. He thinks that tuberculosis, syphilis, and sepsis, can be excluded with certainty as causal factors.

The usual *senile changes* in the eyeball have been discussed by **Nagle**. **Bloch** writing of xerophthalmia and the dystrophy of infants, analyses the effect of different diets in a children's home; showing a deficiency in separator milk, that was made by the administration of cod-liver-oil.

**RENAL DISEASE.**—**Martinez** calls attention to the value of amaurosis as an early sign of uremia, if its real character and causation are determined by the use of the ophthalmoscope. **Phillips** reports a case of pronounced acidosis with swelling of the retina in the region of the disc, veins engorged and numerous hemorrhages. Blindness was complete.

**DENTAL DISEASE.**—The forms of dental disease that cause inflammation of the eye according to **Finnoff**, are pyorrhea, alveolar abscess and infections in or around the root, or around crowns and fillings. These conditions may cause keratitis, conjunctivitis, herpes, uveal inflammations, optic and retrobulbar neuritis, scleritis, episcleritis, panophthalmitis, abscess of orbit, thrombosis of cavernous sinus, and post-operative infection complications. He particularly calls attention to the danger of imperfectly filled dental canals. Eye reflexes may be caused by impacted or sensitive decayed teeth, pulp stones, or foreign bodies in the tissues. These may occasion orbital

pain, mydriasis and miosis, hysteric amblyopia, and possibly neuropathic keratitis. **Patterson** reports a case of recurring iritis promptly ended by extraction of an upper molar on the affected side, that was surrounded with pus. In a woman of 85 suffering from keratitis a root was found beneath an artificial denture; and, this with two teeth condemned by X-ray were extracted. Six weeks later the vision had greatly improved, and the cornea had become almost clear.

**DISEASE OF MOUTH, PHARYNX AND TONSILS.**—**Patterson** also reports a girl of 11 years, with interstitial keratitis and uveitis with partial optic atrophy. The inflammation promptly subsided after removal of tonsils and adenoids. **Stauffer** reports two cases of reflex asthenopia relieved by removal of diseased tonsils. A general review of the literature by **Zentmayer** refers to reflex neuroses, oral sepsis, disease of the tonsils and pharynx, and post-operative ocular complications of oral origin. **Beck** calls attention to the relation between exophthalmic goiter and disease of the tonsils; and reports cases in which removal of the tonsils effected a cure of the symptoms when the usual treatment had failed.

**DISEASES OF NOSE AND ACCESSORY SINUSES.**—**Teal** points out that these affect the eye by extension of inflammation into the orbit, by pressure from collections in the sinuses exerted on the optic nerve, or the eyeball; and by toxemia due to absorption from empyema of the sinus. **Andrews** and **Stauffer** call attention also to the *reflex disturbances* of the eye, including asthenopia and disturbances of the ocular movements, as arising from irritative conditions in the nose. **Ziegler**, reviewing ocular signs associated with intranasal lesions, finds the three most active etiologic factors are pressure, areas of hyperesthesia and nasal obstruction.

A case of acute *chemosis* reported by **Tooker** is accounted for by *ethmoiditis*, causing a localized periostitis in the orbit, which resulted in stasis in the orbital lymphatics. Attention has been called by **Stephenson** to acute anterior



ethmoiditis, as a cause of orbital cellulitis in young children. The prominent symptoms are connected with the orbital disease, and little direct evidence of the ethmoiditis may be obtained.

Recovery generally occurs, sometimes with use of hot fomentations locally, and a purgative. In other cases an incision must be made, and sometimes dilated with forceps to give exit to pus. The incision should be as nearly as possible over the ethmoid cells at the upper inner angle of the orbit. He reports 10 cases, occurring in children of 14 days to 12 years of age, mostly under 5 years. In only one case did vision seem to be affected; and in this complete recovery followed. A case of orbital abscess from suppurative ethmoiditis is reported by **Bryan**, in a child 18 months old. Quick recovery followed a radical operation entering the ethmoid cells through the orbit. A similar case with the same treatment and result was encountered in a boy of 11 years.

**Rodman** reports a case of ethmoiditis in a man of 23, with joints and muscles involved in the secondary infection. He became blind in the left eye. X-ray examination revealed empyema of the left ethmoid, and following drainage all symptoms disappeared and vision became normal.

**Pfister** reports the case of a woman aged 20 who, after a week of pain in the head, had blurred vision in the right eye, which in three days became blind. Extensive operations on the ethmoid failed to give relief. But an external opening of the frontal sinus revealed a mucocele; and in two weeks vision was restored to normal.

From a study of reported cases, **White** finds that retrobulbar neuritis may be acute following influenza accompanied by severe pain from distention of the sinuses and inflammation of the mucosa, or it may be chronic with less pain and acting either by pressure or toxemia; or, on opening the sinuses hyperplastic changes and periostitis extending to the optic canal are found. **Frias y Ornate** has written on the subject of ocular disturbances from nasal

disease. **Pooley** and **Wilkinson** report a case of unilateral blindness, with cystic degeneration of the maxillary antrum of the same side.

**THROMBOSIS OF THE CAVERNOUS SINUS.**—**Langworthy** has reviewed the relations of the cavernous sinus to other structures; and among the pathologic processes in which it may be involved, discusses thrombosis, for which he proposes an intranasal operation. **Dean** reported a case first seen with optic neuritis of the right side and chronic suppuration of the sphenoid. Exophthalmos appeared two days later, and death ensued two days after that. **Boot** reports a case arising from furuncle on the side of the nose. Exophthalmos extended to the opposite side in 24 hours. He also saw one arising by extension from the lateral sinus. Both were fatal. **Halipre** and **Petit** report a case of sinus thrombosis following otitis, with bilateral facial paralysis.

**ORGANIC DISEASES OF THE BRAIN AND SPINAL CORD.**—**Holden** points out that the routine examination of the eyes of a patient with nervous disease should include: The sensibility of the cornea, size, shape and reaction of the pupils, abnormalities of the extrinsic ocular muscles, acuteness of distant vision, fields of vision, exophthalmos, protraction of the lids, and evidence of inflammation, injury or operations. He takes up the details with reference to each of these points.

From his study of 53 cases of dementia precox **Teal** concludes that the changes in the optic disc and fundus of the eye are not pathognomonic. He believes, however, that there is an eye syndrome in this disease, viz: enlargement of the pupil with absence of its psychic and sensory reflexes and natural "springiness."

**Unger's** study of the etiology and symptomatology of juvenile tabes includes reports of four cases and a review of the literature. In all his cases there was hereditary syphilis; and other factors seemed of minor importance. In one case the first symptom appeared in the seventh year, in 2 cases in the eleventh year, and in one between



16 and 20. In all there was loss of the light reflex. Anisocoria occurred in one; the accommodation showed total paralysis in one, and the lid movements were disturbed in the others. Atrophy of the optic nerve was an important symptom in all, with accompanying changes in the field of vision.

**Parker** reports a case of multiple sclerosis with ocular changes, the history of which began at the age of 17, with diplopia and failure of distant vision. The optic nerves were pale and the fields of vision concentrically contracted. There was nystagmus and some dilatation of one pupil. He points out that the ocular symptoms may be necessary to make the diagnosis between this disease and hysteria.

Of **Birch-Hirschfeld's** 86 cases of disseminated sclerosis 71 showed ocular symptoms; 19 of these had pallor of the optic disc, 15 in both eyes. But in 15 cases of pallor of the disc, vision and the fields were normal. In one case there was retrobulbar neuritis with central scotoma; and in 7 cases optic neuritis or retrobulbar neuritis. All of these latter were under 30 years of age. Muscular defects were found in 13 cases. The indications that retrobulbar neuritis will be followed by disseminated sclerosis, according to **Jocqs**, are youth of the patient, unilateral veiling of sight, headaches preceding the eye symptoms, a larger scotoma than with toxic amblyopias, and a brief duration, usually not more than 7 or 8 weeks.

**Wechsler** urges that no essential differentiation can be made between tabes, paresis, and cerebrospinal syphilis, so-called. He thinks the terms paretic, tabetic, meningovascular, and diffuse neurosyphilis, are much better. He reports a statistic study of 122 cases, 92 of tabes and 30 of paresis. In the former the Argyll-Robertson symptom was present in 76 per cent, and in 4 per cent the pupils were normal. Miosis occurred in 32 per cent. Anisocoria occurred in 30 per cent, mydriasis 4 per cent. The shape of the pupil was irregular in 39 per cent. There were muscular palsies in

7 per cent, all unilateral. Optic atrophy generally bilateral was found in 16 per cent, and true nystagmus in one case. In general paralysis the Argyll-Robertson symptom was found in 37 per cent, and optic atrophy in 6 per cent.

Two cases of multiple sclerosis reported by **McGurn** are ascribed to the repeated inhalation of *carbon monoxid* from furnace gas. Disturbance of eye movements, diplopia, nystagmus, inequality of reaction of the pupils, and great impairment of vision were noted. The optic discs were swollen and edematous with enlarged veins. Repeated Wassermann reactions were negative, and other evidence tended to exclude syphilis.

Blindness following violent convulsions is reported by **Pritchard**, and he adopts the explanation that such attacks are produced by nerve storms, involving the visual as well as the motor centers. The ophthalmoscopic appearances were almost normal throughout.

Three cases of *herpes zoster* ophthalmicus are reported by **Klinedinst**. Serious involvement of the cornea occurred in each, an ulcer being formed by the coalescence of smaller lesions. In the local treatment holocain was used with good results. The relation of ophthalmic conditions, especially optic neuritis, and disturbances of eye muscles, and the intracranial complications of aural disease are discussed by **Smith**.

A case of myasthenia gravis is reported by **Krähenbuhl**. The patient was a woman of 31 and the trouble began at 20 with diplopia appearing toward evening and slight ptosis of the left eye. She improved from time to time under rest, massage, potassium iodid, strychnia, heliotherapy, arsenic and galvanization, but relapsed. The ptosis became bilateral, and there was nystagmus and lacrimation.

**FUNCTIONAL NERVOUS DISEASE.**—A case of neuromyasthenic ophthalmia reported by **Merida Nicolich** followed the injection of alcohol into the Gasserian ganglion for persistent trigeminal neuralgia. Five days later there was failure to close the lids, some blurring of vision, but no complaint of lacrima-

tion. Examination showed a neuro-paralytic keratitis, which grew progressively worse with ulceration and suppuration that involved the conjunctiva and extended into the lacrimal sac.

To a group of definite nervous symptoms and break down, caused by eyestrain, **Des Voeux** applies the term "blepsopathia." Its leading symptoms are headache, migraine, depression of spirits, fatigue, fear and panics, indigestion, disorders of sleep, giddiness, and "attacks," which seem to include syncope, petit mal, vertigo, unconsciousness, epilepsy, vomiting, and temporary paralysis. He gives a table of 100 cases illustrating this condition. The eyestrain which causes these symptoms is produced especially by the minor degrees of errors of refraction, in brain workers and town dwellers. It is uncommon with the higher degrees. It first shows in childhood, is easily cured in youth, and with more difficulty in older persons. It is useless to pay attention to the patient's report on his eyesight, and the opinion of many oculists is but little more reliable.

**Harwood** finds that an uncorrected error of refraction is always a potential cause of giddiness. Heredity and education may be disastrous, but once the muscular mechanism has become unstable vertigo may arise from any special strain, as reading, stooping, lacrimation, watching moving pictures, glare, or games like tennis. Among remedies for deficient nerve energy **Harwood** elsewhere suggests, covering one or both eyes, use of cycloplegics, accurate correction of refractive errors, and the use of prisms or of tinted lenses.

**Oloff** writing on psychic injuries of the eyes in war states that few are caused by battle. Most cases are local manifestations of hysteria, as shown by other symptoms, but he gives two cases in which hysteric symptoms were confined to the eyes.

**Loeb** reports a case of hysteric complete ptosis in a girl aged 10. forcible massage of the lids, with the suggestion she could open her eyes, enabled

her to do so, and subsequently galvanism completed the cure. As a cause of hysteric blindness **Morrison** suggests fear of blindness from persistence of after images. He reports 2 cases occurring in a girl of 11, and a boy of 12.

A class of visual hallucinations occurring in middle aged women during the involuntal period is discussed by **Gordon**, who reports 4 cases. The images seen were multiple, all of a diminutive size, and resembled each other in color, position, and actions. His patients all recovered. In a paper on hysteric disorders of vision **Yealland** makes a distinction between cases in which paralysis is accompanied by contraction of antagonists and cases in which no such contraction occurs. The phenomenon may be demonstrated with reference to blepharospasm, ptosis, and spasm of accommodation. In limitations of the visual fields and amblyopia muscular contractions may be observed in other parts of the body.

Migrain with ophthalmoplegia, **Kennedy** suggests, may be due to increase of intracranial pressure, which might be capable of producing paralysis of the cranial nerves. In discussion **Onuf** inquired how the cases accompanied by transient hemianopsia would be explained. **Litchy** found migraine the most frequent form of headaches, occurring in 700 out of 15,000 patients. Much may be done for it by attention to causes that excite or aggravate the attacks.

**SYMPATHETIC LESIONS.**—**Burger** points out that the Claude Bernard-Horner symptom is rarely met with in war injuries, wounds capable of producing it usually proving fatal from hemorrhages. He reports a case caused by a fragment of glass in which death from hemorrhage was prevented by tying several vessels. The next morning there was slight ptosis, moisis, and enophthalmos with preservation of pupillary reflexes and excessive lacrimal secretion. Intraocular pressure was equal in the two eyes, visual acuity was unaffected but there was diplopia on looking up and to the opposite side. Three weeks later the last two symptoms had disappeared, the others re-

maintained. There was no vasomotor disturbance or alteration of respiration.

**THE OPHTHALMOCARDIAC REFLEX.**—This attracts wide attention but its literature yields little of interest to the ophthalmologist. **Laubry** and **Harvier** believe it acts by exciting the pneumogastric nerve so that its affects are multiple and complete. Opposite results may be obtained when the compression is prolonged from those where it is brief. **Petersen** thinks the reflex deserves great attention because it is easy to elicit, and more effective than pressure on the nerves. **Mougeot** and **Duverger** discuss the reflex in wounded men. Of 190 wounded in the eyes, 5 developed bradycardia probably from concussion; which may act by hypertension of the cerebrospinal fluid. They think that if the reflex reappears after trephining the disturbances are only functional. But when there is no return organic lesions must be assumed.

**Oppenheim** has studied this reflex in 47 men who had suffered from brain concussion, and in 87 whose skull wounds had required trephining. No regularity of the phenomenon could be observed, but he thinks it may afford a valuable basis for estimating the

significance of subjective symptoms. **Gorriti's** investigations among 721 insane showed that the normal reflex was obtained in 589, and no type of mental disease gave exclusively negative findings. **Aquini** reports a case of hiccough that had continued over 24 hours uncontrolled by other treatment which yielded at once to compression of the eyeballs. The pulse grew slow and the exhausted man fell asleep. A recurrence next day was aborted by the same procedure.

**GENERAL PAPERS.**—In a paper on some of the general *skin diseases* with ocular manifestations, based upon 10 cases, **Weidler** discusses: Acne rosacea, Blepharochalasis. Eczema, Favus, Leprosy, Lupus erythematosus, Solid edema and Pemphigus. Under the heading "Disturbances of Vision from Pelvic Disorders" **Rumsey** reports five cases, including: Interstitial keratitis aggravated, and episcleritis recurring at the menstrual period; retinal hyperesthesia, retinitis and optic neuritis. Papers on the relation of the eye to general diseases have been published by **Fischer**, **Alexander**, **DeBoe** and **Adams**.

## PARASITES.

M. URIBE-TRONCOSO, M. D.,

NEW YORK, N. Y.

This section deals with the animal parasites which affect the eye, whether located in it or elsewhere. It reviews the literature from January, 1917, to September, 1918.

**MYIASIS OF THE CONJUNCTIVA.**—**Navarrette y Mas** has observed a case of myiasis in a woman, the daughter of a shepherd, who suddenly felt in the left eye a sensation of foreign body with itching and frequent sneezing. Two days afterward she could observe by looking in a mirror, that small, white worms moved in the eye. On examination the author found three worms on the bulbar conjunctiva and six in the upper fornix, which were extracted and proved to be larvae of the species *Rhincestrus nasalis* (de Geer, 1776).

**Maggiore** reports the case of a boy, who for eight months had been treated for a circumscribed inflammation in the upper segment of the scleral conjunctiva, without discharge. A transparent cyst was afterwards formed near the sclerocorneal limbus. The upper quadrant of the bulbar conjunctiva showed on examination a large number of dilated veins, superficial and deep; and adherent to the sclera a roundish structure approximating in shape a cigar, about one centimeter long and three millimeters wide. Inspection with the bin-



ocular microscope revealed the presence of an encysted parasite, disposed in imbricated rings, which after removal was recognized as a fly larva; but the exact variety could not be determined. An interesting point is the absence of any inflammatory process, and the resemblance to an ordinary lymphatic cyst of the conjunctiva.

**CYSTICERCUS.**—**Chistyakoff** has written on cysticercus in the eyelid, and **v. Herrenschwand** on the subretinal variety. But their papers are not available for review.

**HYDATID CYSTS.**—**Demaria** asserts that although *echinococcus* is one of the every day affairs of surgical practice in Argentina, where it is very common in the orbit and all parts of the body, the intraocular localization of this parasite has never been described in that country. Even in the whole ophthalmic literature there are only four cases reported, and only one of them is entirely reliable. This is more surprising when contrasted with the cysticercus, which is so frequently found in the interior of the eye. Yet both tenias, the solium and the echinococcus, live and migrate in the same way.

**Demaria's** patient had a secondary glaucoma in the left eye, which was attributed at first to an intraocular tumor. A trephining operation was done; but the relief was temporary, and the pain came back so that the eye was enucleated. Section of the eyeball produced a clear, transparent liquid, and showed the vitreous completely filled by a cyst, which everywhere veiled the retina and was adherent to it, the ciliary body and the lens.

The cystic membrane had the usual characters of the echinococcus; but no free daughter cysts were present, only several proligerous vesicles were adherent to the wall and contained scolices. A very important feature was the absence of a pericystic membrane and of leucocytic infiltration, which the author attributes to the lack of inflammation in the intraocular structures; greatly contrasting with what so commonly occurs in cysticercus cases, where an intense iridocyclitis is almost the rule.

In order to ascertain if the echinococcus could be reproduced experiment-

ally in the interior of the eye, **Demaria** made injections of hydatid sand, taken from the liver of man and pig, in the anterior chamber and vitreous of rabbits' eyes. After some months he was able to observe the reproduction of the disease; cysts being formed in the cornea, iris, ciliary body, sclera and vitreous, and also under the retina. He could also demonstrate that the proligerous vesicles, and even the scolices, are able to reproduce echinococcus cysts, as **Davé** has previously pointed out.

**FILARIASIS OF THE CONJUNCTIVA.**—**Stuckey** and afterward **Trimble**, have described under the name of "Circumocular Filariasis" cases of conjunctival worms, found in men and in one dog, in China. The first author examined a patient complaining of having "worms" in his eye, who produced a bottle containing an object similar to a piece of thread, which he had removed from his right eye two days before. Examination failed at first to disclose anything abnormal on the conjunctiva, but on careful inspection of the upper fornix, an almost invisible body was seen moving freely. Three other worms were also found and extracted, all of them looking like white threads.

**Trimble's** patient had a marked ectropion of the right lower lid and a slight one in the left, which began two months previously with pain, excessive lachrymation and later inability to close the eyes. The ectropion was more of a sagging away of the lids, and proved to be due to a complete facial paralysis on the right side. There was slight conjunctivitis, but a careful observation brought to light in the superior fornix of the right eye two small worms, of a pink colour and very active, which were easily distinguished from the slightly congested membrane.

As soon as these were removed the pain subsided, epiphora disappeared and the muscular tone of the paralyzed area was restored to at least 50 per cent of the normal. The facial paralysis was probably due to the parasitic irritation, extending over three months.

**Houghton** who examined the parasites obtained from **Stuckey's** case, and another coming from the eye of a dog,

declared them to be varieties of the *Filaria palpebralis*, Wilson, 1884; a nematode worm commonly affecting the eye of the horse. These filariae have also been found on cattle in France, Belgium and India.

**Leiper** summarizing the reports of these cases believes that, according to the description, the parasites differ from filaria worms in several important respects, both as regards their morphology and development. These worms have been recently (1915) grouped by Railliet in one family; the *Thelaziidae*, divided in three genera: *Thelazia*, *Ceratospira* and *Oxyspirura*. All parasites found in the eyes of mammals are now confined to the genus *Thelazia*. The other two genera contain the worms which live in the eyes of birds. In the cases reported above, the parasite was certainly of the *Thelazia* genus; although it is not certain if it was the *T. lacrymalia* or the *T. callipoeda*.

**Cabaut** has observed two cases of *filaria loa*. In the first the parasite was moving rapidly under the skin of the lower lid, from where it was removed by means of a threaded needle passed around the worm; the thread being immediately tied in order to capture the parasite. A small incision on the skin afforded a way to pull out the filaria. Another worm was seen under the conjunctiva in the same eye some days afterward and partially removed. Examination of the blood in day time demonstrated great quantities of embryos surrounded by a sheath and marked eosinophilia. In the second patient the parasite was also observed under the conjunctiva. Attempts at extraction were only partially

successful, due to the swiftness of the worm.

**Pacheco Luna** describes some disturbances of vision in patients suffering from a disease known in Guatemala as "Coast erysipelas" and due, according to the researches of Dr. R. Robles, to the infection with a variety of filaria, probably the *Onchocerca volvulus*, Leuckart, 1893. The doubts still existing about a definite classification are due in part, to the fact that none of the European authors mention among the symptoms produced by this parasite the ocular disturbances, which have been the most important in the author's cases.

These disturbances are: photophobia and diminished vision as subjective signs, and objectively a keratitis especially marked in the part disclosed in the palpebral fissure, and consisting of small dot-like whitish, superficial infiltrations similar to the keratitis superficialis punctata of Fuchs, and the central subepithelial keratitis of Adler. There is no conjunctival or ciliary injection. Iris normal. These lesions run a chronic course lasting for years and when recovery is to be made they diminish, but do not disappear completely, leaving permanent infiltrations.

If the disease goes on unchecked the iris becomes involved and a chronic, insidious iritis sets in, with contraction of the pupil and great diminution of sight. At last the dots become more abundant in the lower half of the cornea and form a uniform, diffuse infiltration giving this membrane the appearance of ground glass. The pupil is stretched downward and becomes irregular and occluded.

## HYGIENE.

JOHN A. McCaw, M. D.

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This section deals with the hygienic aspects and prophylaxis of conditions and diseases, the other aspects of which are dealt with in preceding sections. It covers the literature from January, 1917, to October, 1918.

**LIGHTING IN ITS RELATION TO THE EYE.**—In **Ferree's** work the object has been to compare the effect of different lighting conditions on the eye, and to

find the factors in a given lighting situation which cause the eye to lose in efficiency and to experience discomfort. Tests were made to determine the



eye's aggregate loss in functional activity and to analyse this effect.

**Powell** discusses the color of artificial light, and its relation to the medical profession; and concludes that the Mazda C-2 lamp gives light that approximates the sunlight. This result is obtained by a blue glass globe that permits the uniform transmission of the various colors of light. The lamps are standard and are listed in sizes from 75 to 500 Watts or from 60 candle power to 550 candle power. This lamp is particularly applicable in the chemical laboratory: In microscopic work, in ophthalmology and in examination of X-ray plates. **Luckiesh** writes on color in lighting and investigation of diffusing glassware; and **Worthing** on rating lamps as to filament brightness with fluctuation.

**Kerr** says that the maximum brightness which the eye is prepared for, is the brightest sky, apart from the actual image of the sun. This amount is generally taken as 2.5 to 3 foot candles to the square inch, and some such amount has been suggested as the standard for any visible source of lighting. Kerr thinks that the indirect system of lighting is not advantageous where small objects or textural surfaces have to be examined. It would be good in a bank, but bad in a school.

Direct lighting is the most economical method for handling objects or manufacturing processes. But the light source must be kept out of the field of vision, and shaded down to 3 candle power per inch for any visible surface, or it will cause strain and fatigue. Excessive or defective contrast may be equally troublesome. The New York Commission standard of 1 to 20, and 1-100, requires further investigation. Flicker is more evident to the peripheral retina than to the macula, and is due to alteration in light and shade slow enough to invoke continual efforts at adjustment. It is in this, perhaps, that pupillary contractions are most to be regarded.

**Prosser** holds the opinion that the color of the surroundings has an enormous effect on the recovery of the sick, especially those who are depressed

from one reason or another, or are suffering from shell shock. To remove from the patient the idea of being shut in is of utmost importance. So by a color scheme for the ward he endeavors to give the impression of out of doors. The effects are said to be beneficial.

**Marks** enumerates the advantages of good light in factories and the present status of factory light (especially quoting from reports of British Committee on Health of Munition Workers). His summary of general requirements for good illumination in factories is as follows:

(1) Sufficient illumination should be provided for each workman irrespective of his position on the working space. (2) The lamps should be properly selected and so installed as to avoid or minimize strain on the eyes of the workman. The type of lamp should be adapted to height of ceiling and closeness of work. (3) The lamps should be operated from sources of supply which will insure continuity of service and steadiness of light. (4) Adequate illumination should be provided from overhead lamps so that sharp shadows may be prevented as much as possible. (5) In addition to the illumination provided by overhead lamps, individual lamps should be placed close to the work if they are absolutely necessary, and in such cases the lamps should be provided with suitable opaque reflectors. The lamps should be placed if possible without the field of vision.

**INJURIES OF EYE BY LIGHT AND OTHER RADIATIONS.**—**Burge's** conclusions on the injurious effect of ultra-violet radiation on living tissue are: That ultra-violet radiation kills living cells and tissues by changing the protoplasm to form an insoluble compound. The effective region of the spectrum in changing the living material of the cells lies between 254  $\mu\mu$  and 302  $\mu\mu$ . An opacity of the lens can be produced in fish living in solutions of calcium chlorid or calcium nitrat, by exposing the eye of the fish to radiations from a quartz mercury vapor lamp. Abnormal quantities of the salts of calcium and sodium silicat in the cells of



the eyelids and of the cornea increase the effectiveness of ultraviolet radiation in producing anterior eye trouble.

**Verhoeff** and **Bell** in their work on the "Pathological Effects of Radiant Energy on the Eye" conclude as follows: "Abiotic action for living tissues is confined to wave lengths shorter than  $305\mu$ , at which length abiotic effects are evanescent, while for shorter wave lengths they increase with considerable rapidity.

Liminal exposure capable of producing photophthalmia to the extent of conjunctivitis, accompanied by stippling of the cornea is in terms of energy  $2 \times 10^6$  erg-seconds per square centimeter of abiotic radiation, of the character derived from the quartz lamp or the magnetite arc. About 2 1-2 times this exposure is required to produce loss of corneal epithelium.

The abiotic action on the cornea and conjunctiva produced by any radiating source follows the law of inverse squares, and is directly proportional to the total abiotic energy received. After exposure of the eye to abiotic radiations, there is a latent period before any effects, clinical or histologic, become perceptible.

The combined effect of repeated exposure to abiotic radiations is equivalent to that of a continuous exposure of the same total length, provided the intermissions are not long enough to establish reparative effects. Actual abiotic damage to the external eye renders it temporarily more sensitive to abiotic action.

**SNOW-BLINDNESS.**—**Daland's** conclusions after a visit among Eskimos are: (1) The Eskimo possesses no immunity from snow-blindness. (2) Snow-blindness occurs on cloudy days or dark days as well as on sunny days. (3) One attack of snow-blindness predisposes to another. (4) Snow-blindness occurs in animals. Ross saw snow-blindness in a bear in the arctic region. (5) Eskimos show great cleverness in making goggles for prevention of snow-blindness. (6) There is association of conjunctivitis and corneal erosions with chorioretinitis in snow-blindness. (7) The ultraviolet

ray causes conjunctivitis, corneal erosions, and possibly chorioretinitis.

**MOVING PICTURES.**—**Berry** made a special study on the relation of the moving picture to defective eye-sight. He states; that with proper illumination of the auditorium and proper projection on the screen, after good mechanical preparation of the pictures, there is small hazard to eye-sight.

**Kerr** thinks constant fixed attention with the eyes in a dark adapted condition is unusual and soon gives rise to strain. The practice of remaining in the hall and seeing the same series of films over and over again should not be allowed, especially by children. The question of the length of such entertainment for children is of importance. The best position to view the pictures from is between 20 and 30 ft. from the screen, on a level with the center. If viewed from nearer than 20 feet or from below or the side futile efforts at accommodation are induced. The amount of flicker depends a good deal on the skill of the operator and the quality of the film.

**Wilson** has pointed out that an investigation carried out in Glasgow schools by H. Wright Thompson, in which 50,000 children were examined, showed that while the proportion of real ocular defects was fairly constant, the proportion of children with defective vision varied from 53 per cent in the crowded and poorer parts of the city to 20 per cent in the outskirts where the children enjoy good hygienic conditions. The patients attending Harman's clinic were of a respectable artisan class and lived under good hygienic conditions. The only novel factor to account for the increased number of children with defective vision without any organic ocular defect seemed to be the cinematograph.

**Pollock** believes, that with frequent attendance at moving picture shows, children from 4 to 8 years of age develop a tendency to convergent squint, in the absence of errors of refraction; and in older children it causes congestion of the optic nerve and eye strain.

**Bahn's** conclusions are that moving pictures under favorable conditions do

not cause as much fatigue as the same period of concentrated reading. Most persons who complain that moving pictures cause eye discomfort have some ocular defect. Under favorable conditions the pictures act as a test of distant eye endurance.

With regard to the lighting of moving picture houses, Kerr makes these suggestions: (1) That the standard of illumination of the screen be fixed at a minimum of 1 foot candle. (2) That the material of the screen should be good matt-white screen. (3) In illumination of the theater, extreme contrasts between the screen and the general surroundings should be avoided. The ratio of 1:100 would imply brightness of surroundings of not less than 0.01 to 0.02 foot candles. For illumination of the seats 0.02 to 0.05 foot candles has been suggested. Any lights indicating exits should be screened so that their brightness does not exceed 3 c. p. per square inch.

**EFFECTS OF GLARE.**—Kerr states that *glare* is more important than abnormal refraction or the provision of spectacles. He points out that eye strain due to its influence becomes increasingly obtrusive after the twelfth year: It is especially insistent in reading, writing, and figuring; and is particularly distressing under artificial illumination. He urges as an absolute rule that no naked filament, mantle or flame should be permitted; nor any source of light with greater intrinsic brilliancy than three foot candles per square inch. The influence of paper in producing glare is explained. The blackboard, as a source of glare, comes in for attention.

**ILLUMINATION FOR FINE HAND WORK.**—Pol thinks that the practical conclusion is that it is impossible to set up a definite standard for minimum illumination; the individual conditions vary so widely. If a minimum is to be selected the tests described point to 288 candle power meters, for vision of 0.8 to 0.5.

**EYE STRAIN AND HIGHER EDUCATION.**—Heard presents the subject of hygiene of the eyes in relation to the school life of the child, and carries it

up to the field of higher education in college and university.

**CLASSES ON THE CONSERVATION OF VISION.**—Irvin reports that the children assigned to this class are those whose eye-sight is so defective as to make continuous use of the book type of ordinary size inadvisable; and whose distant vision with glasses is more than 6/60 and less than 6/15. Children with high refractive errors, which are likely to be progressive unless all eye strain is removed, are also regarded as suitable candidates tho their vision exceed 6/15. The aims are first to instruct the pupils with a minimum of eye strain; second to conserve the vision they possess; third to provide such vocational guidance, and if necessary vocational training, as will enable them to fill the most useful places in the community their powers will permit.

**OCULAR WORK AND REST IN CHILDHOOD.**—Cutler states in the introduction to his paper that it is not based on data, contains no narration of cases or of results, and deals with matter essentially commonplace. But he speaks of children's eyes in relation to their work, with especial reference to certain tendencies, the early recognition of which is vital to normal development.

**UNUSUAL DANGERS.**—Jackson in an editorial comment on the great number of persons blinded in the Halifax disaster, points out the dangers in certain emergencies of standing facing window glass. Sudden explosion, or wind may produce injury leading to blindness. He also points out the great danger there is in the free use of the air-gun in the hands of children.

**PROTECTIVE GLASSES.**—Greeff describes two substances, *cellon* and *triplex glass*, which have proved useful in the manufacture of war glasses. Cellon is a derivative of cellulose and related to celluloid; but is not inflammable and not affected by acids or acrid gases. It is used in very thin plates in sand glasses, gas masks, airships, etc. Triplex glass consists of two thin plates of plate glass, with a layer of cellulose between, which prevents wounds of the skin and eye when they



are splintered. The official military snow spectacles, which have proved useful, are made of simple smoky gray glass with a lateral wire sieve attachment. For gas masks, plates of cello are mostly used.

**Higgins** recommends triplex glass for spectacles, as a substance that will not break and splinter. He advises every one who has to wear glasses for distance, especially those who shoot, to have them made of triplex glass. Such glasses guard against injuries from small foreign bodies, such as shot; and so far as he is able to judge, there is no difference in refraction between triplex and ordinary glass. **Giuseppi's** iron goggles having slits, transverse and slanting, permit ample vision. A circular piece of woolen goods is fastened around the part that serves as a lens. This absorbs sweat dripping from the forehead.

**Cruise** examined 320 eyes injured in war, and comes to the conclusion that slightly over 50% of injuries to the eyes in war are preventable. His percentage agrees with the findings of Morax and Moreau. Both Cruise and Morax agree that some sort of visor or shield would prevent these injuries. Cruise invented a steel mesh visor that fastens to the helmet for this purpose.

**Walter**, with large experience along beaches and roads of Florida, finds that amethyst tinted Crookes' and noviol glasses are better than amber tinted ones. The lightest shade which gives relief from irritation is always given.

**Richardson** evolved the idea of making use of the *stenopic slit* in spectacles to wear in the movies. He found them very beneficial. They have been tried and found highly efficient for other purposes than just the movies. They have been tried by pilots and by the captains of several large liners, and they have found that in moonlight or on a sunny day they can see farther with the spectacles than they could without them. The United States Government has made a number of tests, on the firing line and in the aviation field, and the efficiency of the marksman is greatly improved by the use of these spectacles.

**Kirkpatrick**, to protect the eye after cataract extraction, has a special form of goggles made of aluminum. The shield is made to fit the orbital margins. The two shields are held together by a piece of tape which serves as a bridge and is kept in position by a tape passed round the head above the ears. Each has a large opening in it. For the eye operated on this opening contains a lens of amber glass; the other opening is left free. This sort of protection has been substituted for the dressing the day after operation.

The different types of goggles for protecting the eyes in industrial processes, **Luckiesh** enumerates as:

Goggles for protection against flying materials; Goggles for protection against gases, fumes, and liquids; Dust goggles. "The goggle has the greatest possibilities for the saving of the sight of men engaged in hazardous industrial occupations."

"The requirements of goggles for protection in these operations are that they shall provide sufficient reduction of the intensity of the light, be effective in absorbing the ultraviolet rays, keep the eye cool, and transmit as much as possible of the visible spectrum without color distortion."

Valuable data on this subject are given in a recent publication entitled, "Glasses for Protecting the Eyes from Injurious Radiations," by **Coblentz** and **Emerson**. "The data given by these investigators show that of the infra-red rays emitted by a furnace heated to 1,000° to 1,100° C., (1) 99% are obstructed by gold plated glasses; (2) about 95%, by sage-green or blue-green glasses; (3) about 60 to 80% by very deep black glasses, and (4) about 60% by greenish-yellow glasses. At higher temperatures these data would be somewhat different."

The glass, which, in the opinion of Crookes, provides most satisfying protection is sage-green in color, which in a plate 2 mm. in thickness, is opaque to 98% of the heat radiation, absorbs the ultraviolet rays beyond any possibility of their proving objectionable; and at the same time transmits 27.6% of the incident light.



# DIGEST OF THE LITERATURE.

## OPHTHALMIC SOCIOLOGY AND HISTORY.

WILLIAM H. CRISP, M. D.

DENVER, COLORADO.

This section deals with the literature relating to the history of ophthalmology, the professional relations of ophthalmologists, the economic applications and social bearings of ophthalmic science. It covers the literature from January, 1917, to October, 1918.

**PROPHYLAXIS.**—A paper by **Rovinsky** arrives at the following important conclusions: The early recognition of such ocular affections as keratitis and corneal ulcers in school children is so urgent that it devolves upon the state to render proper and timely aid in detecting and treating such affections whenever the parents are unable to obtain such aid themselves. The establishment of school eye clinics should be considered as a part of the system of medical school inspection, their number to conform to the needs of the surrounding neighborhood. As regards contagious eye diseases, it should be made obligatory upon the parents of public, parochial, and private school children to resort to these school clinics for diagnosis and treatment, until the children are cured and readmitted to school; unless they present sufficient evidence that their children are being treated by private physicians. Instead of resorting to private charitable agencies to procure eye glasses for children who need them, it should be the business of the clinic to supply the children with glasses either at nominal cost by arrangement with competent opticians, or free of charge.

Pamphlet number 12, issued by the National Committee for the Prevention of Blindness, on eye hazards in industrial occupations, is a valuable account of a survey of representative industries in the city of Buffalo, made by the committee in the latter part of 1915. The survey covered seventy plants, employing a total of thirty-five thousand workers. Special recommendations are made as to the precautions necessary for prevention of industrial acci-

dents among the various classes of workers. Pamphlet number 13, of the same series, "Saving Sight a Civic Duty," describes the steps taken by the city of Buffalo for the conservation of sight of its citizens. During the year 1916 the city of Buffalo did not develop a single case of blindness produced by ophthalmia neonatorum. It is suggested that an important addition to the clinical provision already made for the care of the eyes of the city's children would be some arrangement by which children who have passed the age of two years but have not yet entered the public schools could be properly looked after.

A very serviceable review of the subject of the conservation of vision, for the information of school teachers, is contained in an address by **McGuire** to a teachers' association. The address by **VanCleve** refers to an estimate that for every child allowed to go blind the state is obliged to spend from four thousand to eight thousand dollars. **Henderson**, a non-medical Indian civil servant, has written a brochure on the subject of blindness in India and the possibilities of its diminution. The reviewer of this brochure regards it as showing an extremely intimate acquaintance with the problems involved, and as presenting practical proposals for a remedy. Memorandum 15 of the Health of Munition Workers, (Brit. Jour. of Ophth., v. 1, p. 129), relates to the effect of industrial conditions upon sight.

**TRAINING OF THE BLIND.**—The outstanding feature of the literature with regard to training of the blind is discussion of the best methods to be em-

ployed in the training of the large numbers of soldiers whose sight has been destroyed. The most cheering group of contributions to the solution of this problem relate to the very successful institution established by Sir Arthur Pearson at St. Dunstan's in London, England.

An excellent account of the work accomplished at St. Dunstan's is given by **Lawson**. In addition to the London accommodations for four hundred men, four convalescent homes outside the metropolis serve a useful purpose in providing the men with trips for rebuilding their health. The condition of admission is that the patient's sight shall have been so injured that he is incapable of leading an independent existence. The great factor in the success which has attended St. Dunstan's is stated to be the youth of most of the patients. **Lawson** remarks, it is far better to go blind young than to lose sight after middle age. The men are taught to shun self pity, and are encouraged to accept their lot as an inconvenience and not as a disability. A further important point in training is the teaching of independence.

In actual training the blind men are given a working-day of four hours, two hours being given up daily to the study of Braille and typewriting, and two hours to the learning of handicrafts or trades. It is found that the intense concentration necessary in the blind, for mental visualization of everything that is learned, produces fatigue in a relatively short time. Two of the rougher trades are usually learned by each man; except in the case of a few who are especially adapted to such occupations as massage, poultry-farming, and telephoning.

In opening a discussion on the employment of the blind, **Pearson**, who is himself blind, emphasizes the importance of utilizing blind teachers for the teaching of the blind. The blind teacher is paid a salary on the regular basis. Nothing is more encouraging to the blind man than to be taken hold of and shown how to do things by one who was himself blinded only a few months earlier.

At St. Dunstan's the writing of shorthand is mastered by the blind in seven or eight months, and these blind men have shown themselves capable of doing efficiently the ordinary work of shorthand correspondence clerks. The blind man is taught not only to work but also to play; his recreational opportunities including reading and typewriting, playing games, and playing on some musical instrument, or singing. A great deal of attention is devoted to physical exercise, which includes rowing, walking, swimming, and tandem-cycling.

The third annual report of St. Dunstan's Sir Arthur Pearson contests the German estimate of two thousand blind in the spring of 1917, within the definition of blindness (V. equals 1-25th) accepted by the German War Office. At that date the English figure was about 800 and the the French 2,500.

For several reasons, including the difficulty of teaching Braille to the average man blinded in the war, **Cantonnet** has devised a raised writing in the usual characters. It is stated that those with sight can use this form of writing at the first attempt, that the intelligent blind with nimble fingers learn it in one-half hour, and that even the unintelligent can learn it within two hours. The letters, punctuation, and figures are those ordinarily employed. The writing is done with a Braille instrument, by using a special copper reglet, which has three small grooves for each letter, so that with each groove three dots can be made and with the three grooves nine points are possible. The article is illustrated.

The advantages of Braille over this method of **Cantonnet** are that the former can be used for stenography and music; and takes up somewhat less space, as there are only six points instead of nine. Each method has its own indications. One special advantage of the **Cantonnet** method is that the blind who wish to correspond with persons ignorant of blind writing can do so.

**Herz** describes a method of reproducing in a very small space and very

economically the literature of various subjects, to which the blind may not at present have access. The method proposed is one of electrical reproduction somewhat after the fashion of phonograph discs, in which however the Morse alphabet is employed. To read the reproductions a small apparatus is necessary, upon which they may be read by touch or by hearing. The books thus obtained are said to be even less voluminous than printed volumes, and the process is cheap.

The Committee on the Welfare of the Blind in England, dealt with in the *British Medical Journal* (Dec. 15, 1917) under "Care of the Blind" and "Welfare of the Blind," was instructed "to consider the present condition of the blind in the United Kingdom, and the means available for (a) their industrial or professional training, and (b) their assistance." The report recommends the establishment of a special government department to secure central control, organization, and assistance for existing voluntary agencies, and additional assistance for the blind. It is proposed that the new department shall form a part of the Ministry of Health, whenever such a ministry is created; but it is at first to be set up in the Local Government Board. The report advises that the department should be administered under the immediate guidance of an Advisory Committee of persons associated with the care of the blind.

The following uniform definition of blindness is recommended: "Blindness means too blind to perform work for which eyesight is essential." This was the definition arrived at by the Ophthalmological Section of the Royal Society of Medicine. Uniform and more effectual notification of the disease and the immediate treatment of all cases of ophthalmia neonatorum are recommended; as is also the provision and wearing of goggles in dangerous occupations on an obligatory basis. An excellent summary of the report is given in the *British Journal of Ophthalmology*, v. 2, p. 47. The committee came to the conclusion that as a general rule the earning capacity of the

blind worker could not be put higher than half that of a seeing worker. It was also found that as a rule home industries produced only one-half to two-thirds of the wages earned in workshops. The report estimates that about 3,000 places in workshops are needed for the United Kingdom, at a cost of 500 to 875 dollars each.

The report favors residential institutions rather than day centers for elementary education of young children, and also the employment of blind teachers whose salaries should be on an equality with those of sighted teachers. As regards blind children, an important recommendation is the initiation of an after-care scheme, to enable the authorities to keep in touch with each child after leaving the elementary school until some further stage in education or training is undertaken. Inspection and standardization of production should be combined with a system of coöperative buying of raw materials and selling of produce. There is an urgent need for a central free library for the blind, which would facilitate the circulation and distribution of books available.

It is interesting to note that Sir Arthur Downes, one of the members of the committee, signs a reservation calling attention to the memorial to the General Medical Council from the Ophthalmological Society of the United Kingdom in 1891, which pointed out the desirability of a more general knowledge of ophthalmology by the general medical student. Lawson comments that it is just as true today as in 1891 that the general body of the medical profession does not possess a competent knowledge of diseases of the eye. The *British Medical Journal* (August 18, 1917, page 227), refers unfavorably to the fact that altho the president of the English Local Government Board appointed a committee numbering fifteen, with a departmental official as secretary, to advise the Board on matters relating to the care and supervision of the blind, not one of the fifteen members was a medical man, so that the committee was entirely with-



out expert advice from the medical point of view.

**Bordley**, at a conference on the re-education of the war-blinded, from the point of view of a member of the staff of the Surgeon General of the United States, outlines the provision made so far for the care of blinded American soldiers. He regards the attitude of the blind as one not of happiness but rather of resignation. The education of the blind from the American army and navy is to be undertaken in a military training school for the blind which is located on a magnificent estate in Baltimore. When the blind have completed their courses in that school, trial employment will be given them. The American Red Cross has authorized the organization of the Red Cross Institute for the blind, which will supply the necessary economic and social supervision for soldiers, sailors, and marines from the time of their discharge from the army or navy until they die.

In France, the service as regards blind men from the United States army begins at the base hospital. Here no serious attempt is made to teach the man how to help himself to make a living, but he is shown how to amuse himself. From the base hospital he goes to the special hospital center which has been designated as the point of concentration for the blind. Here he will be taught to read and write and play games; to shave and dress himself, to walk with a cane, to write his own letters, and to read books for the blind. If on arriving in this country his injuries are found to be permanent, he will be taught in the blind institute, where he will ultimately get training in professional work, commercial work, the trades or agriculture.

**Loeb** urges the immediate starting, for the United States as a whole, of one central institution for the care of the blind from the fighting forces; preferably in some large city, with adequate equipment and facilities for the disposal of articles manufactured; with further provision for the aid of such soldiers in their own or other homes.

The paper by **Wright** describes the

vocational work carried on for the blind in Massachusetts, by the State Commission. The papers on the Chicago Lighthouse for the Blind are written by two pupils, **Austin** and **Williams**. An account of the vocational instruction given the blind by the state of Illinois is written by **Comstock**.

Several papers or addresses by German writers on the care and training of the blind cover much the same general ground as do the papers in English already referred to. **Silberstern** emphasizes the importance of a universal understanding of the fact that the blind person can be returned to a life of cheerful productive activity; and further that his systematic training is necessary. **Krückmann** demands that the blind shall as far as possible be returned to their own occupations, or to occupations as closely allied as possible with those in which they were engaged in the seeing period. They should if possible not be separated from seeing persons.

Calling attention to the need for ophthalmologic knowledge among army surgeons, **Elschnig** strongly recommends, in addition to a general improvement in the ophthalmologic training of medical students, a period of three months training in an eye clinic for every active military surgeon, an increase in the number of ophthalmologic specialists, and the establishment of eye stations in all the larger civil and military infirmaries.

The British Journal of Ophthalmology (v. 2, p. 48) describes the library facilities available in the British Isles for the use of the blind. The principal one is the National Library for the Blind in London, which contains approximately forty thousand volumes, representing between seven and eight thousand separate works. Other important libraries are scattered over the United Kingdom. "The re-education and future of the war blind" is the subject of a discussion in the Ophthalmological Society of Paris. The subject of state legislation concerning the blind is very completely reviewed by **Allport**, whose paper reproduces the pamphlet by **Lewis** upon, "What to do

for blind children," published by the American Medical Association, lists the state institutions for the blind in the United States, and gives the laws on the subject in the different states. **Swinerton's** paper relates to the treatment of some of the postural defects and habit motions of the blind.

**VISUAL REQUIREMENTS FOR VARIOUS PURPOSES.**—Under the auspices of the Ophthalmological Society of the United Kingdom and of the Section of Ophthalmology of the Royal Society of Medicine (England), steps have been taken for the formation of a council of British Ophthalmologists for the purpose of advising and assisting government departments and other public bodies as to suitable standards of vision for different occupations, as to measures for the preservation and welfare of the eyesight of the community, and in any other matters in which the knowledge and experience of ophthalmologists might be of special service. (*Brit. Jour. of Opth. v. 2, p. 47.*)

The amended selective service regulations of the United States army provide for the acceptance of all registrants with vision of 20-100ths in one eye and 20-40ths in the other, without glasses; or 20-100ths in each eye without glasses if correctable with glasses to 20-40ths in either eye. Color-blindness is not a cause for rejection, nor is strabismus if the vision is up to standard. **Wilder** emphasizes the necessity that the local examiner should properly arrange the light source in relation to the test card. As a means of escaping trickery, he advises that the test card should be cut across and the parts pasted together with a cloth hinge, hanging the card up so that the first line visible is 20-100ths. **Wilder** also urges that in the present great crisis, the standards of visual requirements for the United States army, at least in certain branches of the service, should be made more elastic; in order that men may not be lost to the service who, apart from their eyes, are in good condition for such service.

**Chance's** paper on the ophthalmic examination of drafted men at Camp Jackson contains a series of statistics

as to the ocular causes for rejection of recruits. The discussion of this paper by **Hansell** was in part to the effect that although the advisory boards were requested to assign men for selective service, yet the limitation as to vision being at least 20-100ths and 20-40ths involved the loss of many men who were eligible for this purpose. **Posey** however felt that a soldier could not possess safely less than 20-100ths vision in each eye, for with a lesser degree of visual acuity it would be impossible for him to escape accident in many situations to which he might be exposed.

A total number of 2,640 cases of defective vision seen at an English ophthalmic center between June and November, 1915, is classified by **Harford**. All the men examined had been previously rejected for military service as being below standard, or on account of certain obvious defects. The most important question was found to be that of myopia. Nearly one-third of the total of cases of defective vision were of myopia which was capable of being corrected by glasses so as to fit the men to shoot.

The Committee of the Ophthalmological Society of Great Britain as to the standards of vision desirable for the British army recommends: That the strength of the correcting lens which a man may wear should not exceed 8. D., spheric, or 4. D. cylindric and 8. D. for the highest meridian of sphero-cylindricals. For men who are to be trained to shoot with the rifle and to serve in the field, the vision recommended is 6-24ths with either right or left eye without glasses; and at least 6-12ths with the right eye aided if necessary by glasses.

For garrison duty at home or abroad the vision recommended is 6-60ths, with either right or left eye without glasses, and at least 6-18ths with the right eye, aided if necessary by glasses; and the strength of the correcting lenses is put respectively at not exceeding 10, 6 and 10 D. respectively. For those who are not to receive military training, but to be employed only in auxiliary services, minimum vision



of at least 6-60ths with one eye, either right or left, with or without glasses, is recommended; and a limitation of the correcting lens to respective strengths of 15, 6 and 15 D. The British Journal of Ophthalmology, v. 2, p. 229, suggests that any man, otherwise physically fit, whose vision is such that he can earn a living in civil life, is capable of efficient service in some military capacity.

**Angelucci**, writing with regard to the Italian army, recommends the adoption for the correction of defects of vision not merely negative spherical lenses but also positive sphere and cylindric lenses. He would also place the minimum visual acuity of one eye at  $1/4$ , and would allow correction of high myopic and astigmatic errors. He would also provide for military instruction of trachoma patients in special quarters. **Trombetta**, however, objects to the proposal to lower the standards of visual acuity for soldiers.

**Elschnig** states that in spite of the great number of myopes in the German army, very few traumatic detachments of the retina have been observed, and also very few injuries from spectacle glass. **Greeff** refers to the use in the German army of zellon, a derivative of cellulose, analogous to celluloid but unflammable and not attacked by acids or strong gases. In thin layers this substance is employed for spectacles protective against sand, wind, and also for masks. A triple glass is also employed, (see p. 239). When the triple glass is broken the fragments have less projectile force and are less pointed.

**Greenwood** outlines the optical equipment (workshop and lenses) which with his cooperation has been established for the United States army in France. The plan was to establish in some central location a plant capable of turning out one hundred and fifty to two hundred pairs of lenses a day, and also to take care of all repair work that might come in. He suggests that a total of sixty-three types of lenses, forty-five cylindrical and spherocylindrical, ten concave spherical, and eight convexspherical, pro-

vides a sufficient equipment for the use of the army; the cylindrical lenses being of course circular to allow for variation in axis. The relation of aphakia to military service is discussed by **Santos Fernandez**, who describes a case in which full visual acuity was obtained with a cataract lens, the other eye being blind; and in which in his opinion the patient, a youth of sixteen years, was adapted to military service. **Kyle's** paper is a brief explanation of various eye conditions for the use of base hospital surgeons.

The Surgeon General, U. S. A. (Jour. A. M. A., v. 69, p. 917), has authorized the formation of units devoted to the surgery of the head, for the purpose of coordinating the work of the brain, eye, ear, nose and throat, and mouth surgeons. **De Lapersonne** prepared for submission to the undersecretary of state of the French health service a report on various military aspects of ophthalmology, especially the organization of ophthalmologic service in the army.

The paper by **Weekers**, of the Belgian army, also relates to the organization of ophthalmologic service in the army. It contains the classification of one thousand consecutive eye cases in the army service. For astigmatic cases the Belgian army makes use of a solid mounting with large round lenses. **Cirincione's** observations on the necessity for modifying the ophthalmologic service in the army relate especially to certain conditions of eye hospital service in the Italian army, which the author considers are capable of improvement. **Smith** describes the work of the eye, ear, nose and throat surgeon at the recruiting depot. **Wallace** writes on the conditions affecting the standards of vision in the army, and **Cruise** on protection of the eye in warfare.

The ocular requirements for aviators are summarized by **Small** as follows: Uncorrected vision of 20-20ths in each eye; binocular vision; absence of nyctagmus; normal muscle balance and competent ocular muscles; normal pupillary reaction and no pupil irregularities when dilated; normal media and fundi; normal visual fields, by perimet-



ric examination; and normal color sense. **Anderson**, of the British army, strongly emphasizes the necessity that the aviator should have unaided normal vision in both eyes and in each eye separately, and also normal color vision; and gives examples from his own experience of fatalities having occurred which were almost certainly due to defects of vision. Candidates should be examined for latent hyperopia, which has in some instances been found to be responsible for bad landings. **Anderson** admits, however, that some pupils, who have had a long experience as aerial observers, learn to fly well in spite of imperfect vision.

**Carson** discussed the visual requirements of the United States navy. Astigmatism greater than 0.75 diopter is likely to interfere with ability to see in sharp focus both of the intersecting lines in the telescopic sights of the large guns. A marked amount of hyperopia is undesirable in a gun pointer, since in the stress of practice or in actual battle the vision may become blurred from relaxation of the accommodation. **Trible**, dealing with ophthalmology as a specialty ashore and afloat, states that as yet it has not been feasible to have an eye specialist do only eye work, but that one man must be able to take care of eye, ear, nose and throat.

An editorial in the *British Medical Journal*, Sept. 15, 1917, p. 367, on eyesight and hearing certificates for firemen in mines refers to a communication by the English home secretary with regard to a provision that a person holding the certificate of qualification as a fireman, examiner, or deputy must subsequently, so long as he continues to be employed, obtain every five years from a school, institution, or authority approved by the secretary of state, or from a medical practitioner, a fresh certificate in the prescribed form, to the effect that his eyesight enables him to make accurate tests for inflammable gas, and that his hearing enables him to carry out his duties efficiently.

**INDUSTRIAL INJURIES AND COMPENSATION.**—The basis of compensation for injuries to the eye is discussed by

**Gradle**. It is recommended that at least two months should elapse, between the time when the last trace of visible inflammation disappeared from the eye involved, before the final estimation of disability is attempted. The variable factors which are to be considered include: (1) The vision of the injured eye, which should be computed in tenths, referring to the best possible vision obtainable with or without correcting glasses; provided that the strength of spherical lens required shall be not more than four diopters different from the spherical lens required to obtain the best possible vision in the other eye. (2) The vision of the uninjured eye, to be computed upon a similar basis. (3) The ability to recognize depth at arm's length or less; and (4) the cosmetic result, since the effect of a disfiguring injury upon the individual cannot be neglected.

These four factors are to be given respective total values of 100, 100, 100, and 50, making a total possible rating of 350. The total of the percentage estimated for the various factors is to be divided by 3.5 to arrive at the estimation of ocular efficiency; the money result being obtained by taking the resulting percentage of fifty-two weeks' wages, which the laws of the majority of states have adopted as the compensation for the total loss of an eyeball. When both eyes are impaired, the total compensation, percentages of which are to be calculated, should be three times that estimated for one eye alone. In cases of direct injury to one eye alone, where the other eye becomes involved by the development of sympathetic ophthalmia, at least twelve and not more than 16 months should elapse before the compensation is determined.

In cases of direct injury to one eye where the other eye is absent, or has vision of 1-10th, or less, the compensation is to be governed by one factor only, namely the ultimate vision. Estimations are also given for injuries outside the eyeball, injury to any part of the head outside the eye resulting in disturbance of the visual field of one eye alone; and injury to any part of the head outside the eye resulting in dis-

turbance of the visual fields of both eyes.

The subject of ocular accidents of industry is considered by **Schleisinger**, who tabulates some of the percentages of compensation allowed by French tribunals; and refers to the Argentine law of 1915, according to which blindness of one eye is to be compensated for on a 42 per cent basis, and loss of both eyes is to be figured as absolute incapacity. **Chapman's** paper as to the determination of indemnities following injuries to the eyes summarizes the provisions of the various states, more especially as to the loss of one eye.

The supreme court of Michigan (Jour. A. M. A., v. 68, p. 2005), affirmed an award by the industrial accident board in favor of a claim as for the loss of an eye; altho the eye had been previously injured leaving just enough vision in it to distinguish daylight from dark, or to tell an approaching object. The legislature of Michigan had apparently not specified a normal eye, but merely referred to the loss of an eye. A decision by the supreme court of New York (Jour. A. M. A., v. 71, pp. 309, 490), held that the loss of the lens of an eye was not the loss of an eye within the contemplation of the workmen's compensation law; since thru the use of an artificial lens the eye, so far as its use alone was concerned, could fulfil the natural function of an eye.

The functional loss from aphakia in the war injured is estimated by **Teulières** upon the basis of the following percentages, which are to be added to the indemnity figure obtained in the ordinary way by means of the visual acuity. (1) One eye not operated upon and having useful vision, the other eye aphakic and obtaining useful vision after correction, 10 per cent. (2) One eye not operated upon and having vision which cannot be utilized, the other aphakic, and having useful vision after correction, 5 per cent. (3) One eye aphakic and not having useful vision after correction, 5 per cent. (4) Both eyes aphakic and having useful vision after correction, 15 per cent.

The Court of Appeals of Kentucky

(J. A. M. A., v. 71, p. 306), held that the loss of sight of an eye from an embolus, which affected the eye upon exertion in the course of the claimant's employment, was not caused by accidental means within the terms of a policy of insurance against bodily injury sustained thru accidental means. **Coulter** describes a case in which an English county court awarded compensation on the basis of a keratitis developed in the second eye subsequently to a keratitis in the first eye which was apparently secondary to an industrial injury.

**Snell** proposes that the questionnaire in cases insured under the workmen's compensation law shall call for information as follows: Central visual acuity of each eye, uncorrected, corrected, expressed in a decimal; field of vision for each eye in decimal; condition of visual muscles, extraocular, intraocular; condition as to binocular or stereoscopic vision; summary of the case, including diagnosis, ophthalmoscopic examination, percentage of useful vision, and prognosis; and to what extent the physician's estimation of useful vision differs from the scientific measure of vision.

**Murray** gives details of, and tabulates, 102 cases of ocular injury and disturbances, encountered among the twenty-three thousand miners of the Lackawanna Coal Company in Pennsylvania. Attention is especially called to the fact that those who reported promptly had an average disability of six and one-half days, whereas out of eighteen patients who did not apply for treatment until from five to ten days after injury, thirteen, with an average disability of thirty-one days, had foul ulcers of the eyes. Certain defects in the application of the law are mentioned.

A chapter of **Beauvieux's** thesis, on visual troubles in injuries by firearms to the visual cortex or the optic radiations, is devoted to an evaluation of the invalidity produced by traumatic hemianopias. While admitting the complexity of the problem, Beauvieux refers to the following as calling for consideration in arriving at a result: (1) the



form of the hemianopia (right or left, quadrant, scotoma, concentric, retraction, etc.); and (2) the participation of the central visual acuity in the perimetric defects.

**Lapersonne** is quoted with approval as indicating that the evaluation of a sector of incapacity should be superior to the incapacity produced by the total loss of an eye. The estimate should be delayed, on account of the frequent occurrence of changes in the extent and shape of traumatic hemianopias during the months following the injury; and **Coutela** is quoted with approval as recommending a maximum of five years for a final decision. It must, moreover, not be forgotten that all these injured soldiers show general cerebral symptoms, and that it is necessary to bear in mind the concomitant nervous disturbances.

**OPHTHALMIC EDUCATION.** — **Jackson** calls attention to the fact that most clinical students of ophthalmology lack the preparatory training which would enable them to profit by their clinical studies. The systematic courses of graduate teaching in ophthalmology, where instruction is given in ocular anatomy, pathology, and optics, are taken by only a minority of those who are preparing for ophthalmic practice. Even an internship in an ophthalmic hospital is largely thrown away on a medical graduate who is ignorant of ocular anatomy and pathology and of physiologic optics. Plane trigonometry is essential to an intelligent study of optics, but is nowhere a preliminary to the study of medicine.

In the department of clinical work the most important portions are diagnosis and the exact estimation of errors of refraction. In the examination of the American Board for Ophthalmic Examinations even men of rather large clinical experience were lacking in regard to the recognition of intraocular conditions and the exact estimation of refractive errors. The worst defects in the present training for ophthalmic practice would be met, if each university that has a medical department would establish short courses in physiologic optics, ocular anatomy, and ocu-

lar pathology, and would bring these to the notice of every medical student, as courses to be taken before seeking clinical training for ophthalmic practice.

The ophthalmic examinations conducted by the American Board for Ophthalmic Examinations now serve as the examinations of the ophthalmic candidates for fellowship in the American College of Surgeons. **Rochon-Duvigneaud** urges that the reconstruction of France after the war shall include reform in the teaching of ophthalmology. One step toward this will be the payment of such salaries to professors of ophthalmology (and incidentally to other teachers of medicine) that they may be able to devote their whole time to teaching work; without sacrificing the situation in their profession to which they are entitled and which can only be maintained on an adequate financial basis. He complains that physiologic optics is not taught, except in an entirely theoretic fashion; and that ocular physiology and special anatomy are not taught.

An editorial comment in the *British Journal of Ophthalmology*, v. 2, p. 147, calls attention to the curious anomaly by which, altho ophthalmic surgeons in England look upon the diploma of the Royal College of Surgeons as essential for appointment to the staffs of ophthalmic hospitals in London, there are no ophthalmic surgeons on the boards of either the membership or fellowship examinations of the Royal College; and the Boards do not often ask ophthalmic questions in their examinations. It was suggested that some body such as the Royal College of Surgeons or the London University, should institute an examination for a scholarship or mastership of Surgery in ophthalmology, rather than allow a number of subsidiary examinations to spring up. The Tennent Chair of Ophthalmology at Glasgow, Scotland (*Brit. J. Ophth.*, v. 1, p. 553), has been established out of a fund of twenty-five thousand pounds left by Dr. Gavin P. Tennent, who died in 1913. The salary attached to the professorship is to be five hundred pounds per annum, and the professor is not to be required, him-



self, to give instruction to undergraduate students, but is to apply himself to the promotion of higher studies in ophthalmology and to research.

**Guthrie**, of Louisiana State University, argues that the ideal course in optics should be based from first to last upon the electromagnetic theory of light, which he complains is at present entirely ignored in the text books and in the usual teaching of the subject. The ordnance department of the United States army has established (*Science*, v. 48, p. 109), a training school for operatives on precision optics. The establishment of this training school was rendered necessary by the fact that there was not an adequate supply of skilled labor for the manufacture of the lenses and prisms required for optical purposes by the army and navy, or for the assembly of these lenses and prisms into finished instruments. An institute of applied optics is the subject of a scheme which is said to be on foot in Paris, France; it being hoped that the institute may be grouped into three sections, a college of optics, a central optical laboratory, and a special trade school dealing with the practical branches of the trade.

**OPTOMETRY.**—State legislation concerning optometry is exhaustively covered by **Allport**, in a paper which further reproduces the complete text of the optometry laws of the various states. Generally, these laws provide that it shall be unlawful to practice optometry without a properly obtained certificate or license; the definition of the practice of optometry being the possession at the place of business of any of the mechanical means for fitting glasses, or the displaying of a sign, notice, or advertisement implying that the eyes are refracted or fitted with glasses.

In Colorado an itinerant license can be obtained by paying an additional fee. The optometrist must not give out the impression of being in any sense a practitioner of medicine, and must not call himself a doctor of medicine or even a doctor of optometry or a doctor of any kind, or an eye special-

ist, or anything of this nature calculated to deceive or mislead the public. In Maryland optometrists are not allowed to sell concave glasses to children under fifteen years of age, nor can they sell glasses to people who have diseased eyes, except with the knowledge and consent of a physician.

In South Dakota the registered optometrists constitute a legal society; which meets once a year, transacts business, and recommends board members to the governor, who selects the members from this submitted list. The secretary of the board is also the secretary of the society and receives a salary fixed by the society, and his expenses. The requirements for examinations and license vary greatly in different states.

The *British Journal of Ophthalmology* (v. 2, p. 435), summarizes the recommendations of Mr. Justice Hodgins, who was commissioned to inquire, among other details of medical education, into the status and practice of opticians or optometrists in Ontario. In that province there are said to be only sixty-five men who specialize in ophthalmology, while there are nine hundred who practice optometry. The commissioner remarks that in a medical education there is no sufficient specific instruction in this branch; and he comments upon the circumstance that few medical men are able to do refraction with accuracy.

He does not see any reason why optometry should not acquire a definite status "if it is willing to do so at the cost of such liberal education as will fit its practitioners for their work." He would add to the course in physics and optics, which he believes should be required for those practicing optometry, sufficient instruction in medicine to enable abnormal conditions to be distinguished, and proposes that the course for optometrists shall be of two years' duration. The final recommendation is that all who practice optometry shall be required to pass the suggested examination within six months.

The Pennsylvania optometry bill was finally passed; and was signed by the governor, who vetoed a bill of sim-

ilar purpose a year previously. He expressed the hope that in the next session of the Assembly the qualifications for admission to the study of optometry may be placed upon a higher educational basis. The optometry act of Illinois has been declared unconstitutional by the Supreme Court of Illinois. The judgment was given upon a case against a man who had tested the eyes of a patient with glasses and had collected a fee, without having a license to practice optometry. The court held that the exemptions in the act, relating to those who have practiced for three years, regardless of character, habits, skill, or knowledge of optometry, showed the act to be unreasonable; and that as no particular standard of skill was required and no examination prescribed, the fitting of glasses under the act did not differ materially from the fitting of shoes by a shoemaker, and that no more reason existed for licensing one than the other.

The decision of the court is said to be in line with its rulings in later years to the effect that the practice of new and special professions will not be permanent unless a general standard is fixed to which applicants must conform, thus creating a valid branch of scientific learning not only in name but in fact. In California, on the other hand, an optometrist who called herself an ophthalmologist failed to obtain an injunction from the supreme court of the United States, to restrain the enforcement of the California law regulating the practice of optometry, which provides that it shall not be construed to prevent duly licensed physicians and surgeons from treating the human eye.

Reeve discusses the optometry movement as seen in Canada, where the opticians, at least as regards the Province of Ontario, aim to secure incorporation as optometrists; and virtually as a profession with powers as to education, examination, licensing and discipline akin to those of the College of Physicians and Surgeons. The provisions of the Ohio optometry bill, with arguments against its adoption, are given in the Ohio State Medical Journal, 1917, p. 94.

NOMENCLATURE.—**Dunn** quarrels with the use of a number of expressions current in ophthalmologic phraseology. The paper is entitled "Ophthalmic Terminology; Its Solecisms and Antiquitation," and it may not be amiss to suggest that the word "antiquitation" is itself inaccurate, as the word properly to be used in this relation is "antiquation." The expressions to which he objects include "bulbus oculi," which he feels is redundant inasmuch as the ball is the whole eye. There is, however, in English usage a distinction between the eyeball and the appendages of the eye. "Ophthalmia neonatorum" he regards as unscientific, "lenticular" he feels should be replaced by "lental," "sclerotic" by "sclera" when used as a noun, and "phthisis bulbi" by "atrophy of the eyeball." The expression "sympathetic ophthalmia" he regards as suggesting that sympathy is a cause for inflammation.

CLINICAL INSTITUTIONS AND STATISTICS.—The question of how the eye and ear service in general hospitals can be improved, is answered by **Allport** with demands for the provision of special quarters, special nurses, special interns, and special equipment for these classes of cases in the general hospitals. A brief description of a professional visit to New York City is given by **Santos Fernandez**, who mentions some of the clinical facilities available, and summarizes some statistics of the Episcopal Hospital.

An account of the New York Children's Eye Clinics is given by **Carhart**. When he wrote there were nine children's eye clinics in New York City maintained by the bureau of child hygiene of the municipal department of health. In those clinics all school children of any of the public or parochial schools were treated for eye diseases or fitted with proper glasses by a staff of competent specialists taken from the eligible lists of the municipal civil service.

Twenty-eight additional clinics for treating contagious eye diseases in the schools had then been asked for. At some of the clinics as many as one

hundred and fifty to two hundred children were treated for sore eyes in one day, during the rush season. It having been found that the virulence of the contagion of trachoma is largely removed by treatment of the disease along approved lines, many of the trachoma cases are no longer excluded from school, if the children are faithful in attendance at the clinic; altho trachoma schools have been started where children afflicted with contagious trachoma can be isolated from other children and yet continue at their studies in special classes suited to their needs. **Brannick** discusses the possibilities of social service work in an eye hospital or dispensary. The Knapp Eye Hospital in New York City is described by Arnold **Knapp**, the son of its founder.

The report on the blind in the United States, based upon the 1910 census, indicates that 30.8 per cent, or somewhat less than one-third of the blind population, lost their sight when less than twenty years of age, including those born blind; 47.4 per cent, or somewhat less than one-half, from twenty to fifty-four years; and 21.8 per cent, or a little over one-fifth, after passing their sixty-fifth year.

More persons had lost their sight when less than five years of age, than in any other five year period of life, 16.4 per cent of the total being included in this group. Persons reported as being born blind formed 6.6 per cent of the total, while 5 per cent had lost their sight when less than one year old, these two groups together contributing 11.6 per cent, of those reporting the age when vision was lost. The thirty thousand blind represented in the returns had, on an average, been blind for sixteen years.

In 1880 persons who became blind before completing their first year of life formed 15.3 per cent of the total reporting as compared with only 11.6 per cent in 1910. The majority of those who have not married before they lose their sight continue single for the rest of their lives. **Genet** estimates the number of men in France between the ages of twenty-three and forty-two

years who have had one eye enucleated as being close to one per thousand.

Statistics as to the occurrence of ocular defects and diseases at the Massachusetts State Reformatory for women at Sherborn are given by **Jessaman**. Statistics, together with an account of the clinical aspects, of ophthalmic practice in Cairo and Alexandria, Egypt, are given by **Eason**; who states that among the troops there is little serious disease, and a good deal of malingering and exaggerated functional disease. **Gibson** writes a report on the ophthalmic department at Lemnos in the British military service.

Notes on the functioning of an ophthalmologic service in the French ambulances at the front are written by **Lacroix**. He found the greater part of the ambulance work to be of a minor nature, such as refitting soldiers who had lost their glasses, removing small foreign bodies, and opening chalazia. Nearly ten per cent, however, of the total number of wounded were eye patients. Some comparative figures as to blindness in Portugal and in other countries of Europe are given by **Santos**. **MacCallan** summarizes the statistics of blindness in Egypt during 1914; and statistics of the Government Ophthalmic Hospital at Madras, India, are given in the annual report of the hospital for the year 1916.

**HISTORY.**—The "British Masters of Ophthalmology Series" in the British Journal of Ophthalmology includes biographic essays, of thoro and attractive literary workmanship, and accompanied in most instances by excellent portrait reproductions. The series is opened by **Fergus** with a sketch of the life of William McKenzie, whose name is known to ophthalmologists as the author of a "Practical Treatise on the Diseases of the Eye," which first appeared in 1830 and ran thru many editions, the last published in 1854.

The three papers by **Dunn** deal with: (1) Benjamin Travers, one of the first general surgeons in England to combine with his work the study of eye diseases; and who succeeded Saunders, the founder of the London Infirmary for Diseases of the Eye, as surgeon to



that institution, which has later been widely known as Moorfields Eye Hospital. (2) James Ware, resuscitator of the suggestion of Pott in favor of the operation of needling, and the first ophthalmic surgeon in England to use extract of belladonna in the preparation of his needling cases. (3) Sir William Adams, a pupil and assistant of Saunders, and the first ophthalmic surgeon to be honored by distinction as oculist to the English royal family. An account of Sir William Robert Wills Wilde (father of Oscar Wilde), a prolific writer on medical and other topics, and who took the first steps in teaching ophthalmic surgery to medical students in Dublin, Ireland, is given by **Story**. **Sym** writes concerning James Wardrop, a pupil of Beer of Vienna at the beginning of the nineteenth century, and surgeon-in-ordinary to King George IV.

**Risley's** history of the rise and progress of ophthalmology as a specialty in Philadelphia gives an account of the Pennsylvania Infirmary for Diseases of the Eye and Ear, founded in 1822; of the activities of a number of famous Philadelphia ophthalmologists; of the recognition of ophthalmology as a specialty about 1870, and of the organization in that year of the Ophthalmological Society of Philadelphia; and of the creation in 1893 of the Section on Ophthalmology of the College of Physicians of Philadelphia. The early history of ophthalmology in Chicago, as related by **Wood**, refers to Holmes, founder of the Chicago Charitable Eye and Ear Infirmary, later the Illinois Charitable Eye and Ear Infirmary; and to a number of other eminent early Chicago ophthalmologists, most of whom were general surgeons who devoted special attention to the eye.

The material for the history of ophthalmology in the Argentine Republic, elaborately presented by **Argañaraz**, includes a sketch of the development of medical education in Argentina, the status of ophthalmology before the establishment of a special chair in ophthalmology in 1875; the establishment of that chair, a series of eminent ophthalmologists who have occupied it, es-

pecially including Lagleyze; a consideration of blindness in the Argentine Republic, the various ophthalmological services in the country, the ophthalmologic society of Buenos Aires, and an ophthalmologic bibliography of Argentine writers on the subject. **Hansell** writes a tribute to Professor Stanculeanu, who left Bucharest at the time of the Rumanian collapse, and who died in the United States after a complete mental breakdown.

The establishment of the new **AMERICAN JOURNAL OF OPHTHALMOLOGY** gives occasion for a series of brief accounts of the careers of the various publications which the new journal supplants. An account of the former *American Journal of Ophthalmology* is given by **Alt**, of the *Annals of Ophthalmology* by **Loeb**, of the *Ophthalmic Record* by **Savage** and again by **Brawley**, of *Ophthalmology* by **Würdemann**, and of the *Ophthalmic Year Book and Ophthalmic Literature* by **Jackson**. In a similar connection (v 20, p. 333) is given a valedictory autobiography of the Royal London Ophthalmic Hospital Reports, one of the publications which yielded place to the *British Journal of Ophthalmology*.

An excellent summary in English of the events leading to the invention of the ophthalmoscope is given by **McMullen**. The instrument described in 1851 in Helmholtz's monograph consisted essentially of a transparent reflector, composed of three thin plane parallel plates of glass, set at an angle to reflect the greatest possible amount of light into the eye; while on the observer's side of the mirror was a holder for a concave lens to enable the fundus details of the patient's eye to be seen clearly. "Like many other important inventions and discoveries, that of the ophthalmoscope was the result of the completion and coordination, by an exceptionally gifted individual, of the work of many previous investigators."

**Shastid's** history of ophthalmology covers 380 pages of volume eleven of the *American Encyclopedia of Ophthalmology*. **Elliot's** paper on eccentricities of Indian ophthalmic practice

is principally a study of Hindu superstitions in relation to the practice of ophthalmology. **Taylor** gives an account of "A Briefe Treatise on the Preservation of Eie-sight," first printed in the reign of Queen Elizabeth of England, from the pen of Walter Bailey (1529-1592).

**Hirschberg's** historical remarks on cataract extraction relate to Silvester O'Halloran's "Method of Cataract Extraction," published in 1788, and to two Italian monographs on cataract extraction by Santerelli, of 1795 and 1805. **Crisp's** review of the history of the op-

eration for cataract summarizes the available records as to the operation of couching as practiced in remote antiquity, and in recent times among the inhabitants of India; and as to the circumstances under which the modern cataract operation was discovered and popularized. A translation is given of a description of the extraction operation by Johann Gottlieb Schäffer, from a small work published by that writer in 1765 under the title "Geschichte des grauen Staares, und der neuen Operation Solchen durch Herausnehmung der Crystalline zu heylen."

# BIBLIOGRAPHY

This includes all papers referred to in the Digest of the Literature. It is arranged alphabetically according to the authors' names. (Bibl.) indicates that the paper is accompanied by an important bibliography. (Dis.) indicates that the paper has been read before some society, and that the discussion elicited is published with it. (Ill.) with number in brackets indicates the number of illustrations printed with the text. (Pl.) with number gives the number of plates accompanying the article.

All titles are in English and many of them are considerably abbreviated. Where a paper has been published in some other language, and a translation, or a good abstract in English, French, or German, the second reference given is to such abstract. The number in small **heavy face** type at the end of each reference indicates the page in this volume on which the paper is referred to.

To find all the papers referring to a single subject, turn to the account of that subject in the digest of the literature, where the authors' names are given in **heavy face** type. From the author's name the paper, or papers he has written, and the places of their publication, are readily found from the following list:

- Abadie, C.** Long Continued Mercurial Treatment in Ocular Syphilis. *Ann. d'Ocul.*, v. 154, p. 734. *Amer. Jour. Med. Sc.*, v. 156, p. 141. 226.
- Abe and Suganuma.** Retinal Degeneration with Multiple Aneurisms. (1 col. pl.) *Nippon Gank.* Zasshi, May, 1917. 116.
- Abelsdorf.** Central Bilateral Scotoma after Wounds of Occiput. *Klin. M. f. Augenh.* March, 1916. *Abst. Arch. of Ophth.*, v. 46, p. 578. 137.
- Abney, W.** Congenital Night Blindness. *Proc. Roy. Soc. Med.*, v. 94, p. 59. 150.
- Adam, C.** Stereoscopic Radiographs of War Wounds. *Heidelberg Ophth. Cong.*, 1916. *Ann. d'Ocul.*, v. 154, p. 166. 209.
- Prothesis after loss of Globe and Shattering of Ocular Region. *Heidelberg Ophth. Cong.*, 1916. *Arch. of Ophth.*, v. 46, p. 594. 181.
- Adams, C. T.** Adenoids a Factor in Amblyopia. *Maine Med. Assn. Jr.*, v. 7, p. 164. 234.
- Adams, L.** Melanotic Sarcoma Arising in Eye with Metastases. *Boston Med. and Surg. Jour.*, v. 176, p. 768. 190.
- Adams, P. H.** Influence of Vascular Disease in Retina on Prognosis as Regards Life. *Brit. Jour. Ophth.*, v. 1, p. 161. 108.
- Adams, W. H.** Diagnosis and treatment of Incipient Cataract. *Jour. Florida Med. Assn.*, v. 3, p. 333. 92.
- Albarenque, J. M.** Ocular Tonometry with a New Tonometer. (2 ill.) *Bol. de la Soc. Oftalm. Buenos Aires*, v. 4, p. 192. 2.
- Function of Rods and Cones of Retina. *Bol. de la Soc. Oftalm.*, Buenos Aires, v. 4, p. 173. 103.
- Cholesterolin in Ocular Tissues. *Bol. de la Soc. Buenos Aires*, v. 4, p. 183. 219.
- Alexander, E. W.** Incipient Systemic Disturbances. Shown by Ocular Signs. *Jour. Ophth. and Oto-Laryngol.*, v. 11, p. 1. 234.
- Allen, H.** Malignant Growths of Eye. *Med. Jour. Australia*, 1917, p. 195. 190.
- Allport, F.** Vernal Conjunctivitis. *Ophth. Rec.*, v. 26, p. 395. 36.
- Corneal Tattooing. *Jour. Amer. Med. Assn.*, v. 69, p. 1641. 51.
- Irrigation in Vitreous Chamber in Suppurative Panophthalmitis. *Ophth. Rec.*, v. 26, p. 620. 153.
- Ectropion Operation with Pedicled Flap. (2 ill.) *Ophth. Rec.*, v. 26, p. 559. 172.
- Operative Procedure for Relief of Contracted Sockets. *New York Med Jour.*, v. 107, p. 484. 182.
- Steel in Eye without Symptoms. *Ophth. Rec.*, v. 26, p. 458. 203.
- State Legislation Concerning Blind Ophthalmology, v. 13, p. 597. 244.
- State Legislation Concerning Optometry. *Ophthalmology*, v. 13, p. 247. 250.
- Eye and Ear Surgeons in General Hospitals. *New York Med. Jour.*, v. 106, 581. *Ill. Med. Jour.*, v. 32, p. 182. 251.
- Almquist.** Parenchymatous Keratitis. *Hygæa*, v. 87, p. 744. 49.
- Alt, A.** Partly Pigmented Nevus of Lacrimal Caruncle. (1 ill.) *Amer. Jour. Ophth.*, v. 34, p. 1. 184.
- Intraocular Tumor with Unusual History. *Amer. Jour. Ophth.*, v. 34, p. 257. 188.
- Necrotic Tumor of Sclerotic. (1 ill.) *Amer. Jour. Ophth.*, v. 34, p. 106. 192.
- The American Journal of Ophthalmology. *Amer. Jour. Ophth.*, v. 1, Third series, p. 148. 253.
- Amalric**, see **Brunetière**.
- Amoretti, E.** Keratoconus and Internal Secretions. *Bol. de la Soc. Oftal.*, Buenos Aires, v. 4, p. 197. 52.
- Amsler, M.** Etiology of Hemorrhagic Retinitis. *Corresp. Bl. f. Schweiz. Aertze*, 1917, p. 318. *Abst. Lancet*, April 14, 1917, p. 583. 108.
- Anderson, H. G.** Visual Requirements in Selection of Candidates for English Air Service. *Lancet*, March 6th, 1918, p. 397. 246.
- Andrade, C.** Cataract Operations. *Brazil Med. Abst. Arch. de Oft. Hisp.-Amer.*, v. 17, p. 216. 93.
- Andrews, B. F.** Ocular Manifestations of Reflex Origin. *Chicago Ophth. Soc.*, Nov., 1917. *Amer. Jour. Ophth.*, v. 1, p. 137. 230.
- Andrews, J. A.** Anterior Chamber Syringe for Irrigation after Cataract Extraction. (1 ill.) *Arch. of Ophth.*, v. 46, p. 256. 94.



- Angelucci, A.** Trachoma in Soldiers. Arch. di Ottal., v. 24, p. 166. 38.  
Problem of Immediate Enucleation. Arch. di Ottal., v. 24, p. 159. 155.  
Ocular Diseases Causing Complete Disability for Military Service. Arch. di Ottal., v. 24, p. 1, 113. 245.
- Antoni, N.** Diagnostic Import of Abnormal Conjugated Movements of Eyes. Hygiea. v. 78, p. 1617. Jour. Amer. Med. Assn., 68, p. 158. 24.
- Appleman, L. F.** Massive Spontaneous Hemorrhage into Vitreous. Amer. Jour. Ophth., v. 1, p. 24. 101.
- Aquino, P. B.** Hiccup Arrested by Compression of Eyeballs. Semana Med., v. 24, p. 483. Jour. Amer. Med. Assn., v. 69, p. 159. 234.
- Argañaraz, R.** Pigmented Retinitis with Atrophy of Choroid and Retina. Rev. de la Asoc. Med. Arg., v. 26, p. 102. 114.  
History of Ophthalmology in Argentina. (14 ill.) Bol. de la Soc. Oftal., Buenos Aires, v. 4, p. 235. 253.
- Argañaraz, R., and Belgeri, F.** Leucosarcoma of Iris. (1 pl.) Bol. de la Soc. Oft., Buenos Aires, v. 4, p. 223. 187.
- Arps, G. F.** Hering Theory of Color Vision. Psychol. Bull., v. 14, p. 47. Jour. Experimental Psychol., 1917, p. 41. 148.
- Atkatzuka.** Injections of Sublimat for Ocular Syphilis. Nippon Gank. Zasshi, July, 1916. 226.
- Aubaret.** Trench Hemeralopia. Lancet, June 2, 1917, p. 853. 118.
- Augstein, H.** Bilateral Pulsating Exophthalmos Caused by Bullet Wound. Klin. M. f. Augenh., 1916, p. 484. Arch. of Ophth., 47, p. 89.
- Austin and Williams.** Chicago Lighthouse for Blind. Modern Hosp., 1917, p. 202. 244.
- Axenfeld, T.** Intraocular Radiotherapy. Heidelberg Ophth. Cong., 1916. Arch. of Ophth., v. 47, p. 109. 8.  
Bilateral Primary Progressive Calcareous Degeneration of Cornea. Klin. M. f. Augenh., Jan., 1917. Brit. Jour. Ophth., v. 1, p. 642. 50.  
Hemianopic Disturbance After Shot Wounds of Skull. (19 ill.) Klin. M. f. Augenh., v. 55, p. 126. Amer. Jour. Ophth., v. 34, p. 312. 139.
- Aymard, J. L.** Cartilage Prothesis for Eye. (3 ill.) Lancet, Oct. 22, 1917, p. 644. 182.
- Azer Wahba.** Fat Grafting After Excision of Globe. Ophth. Soc. Egypt, 1915, p. 51. Ophth. Lit., v. 7, p. 24. Brit. Jour. Ophth., v. 1, p. 564.  
Fly Blown Orbit. (Dis.) Ophth. Soc. Egypt, 1915, p. 85. 180.
- Babbitt, O. M.** Focal Infections Affecting Eye. Northwest Med., v. 16, p. 276. 61, 62.
- Bacchi.** Apparatus for Treatment of Myopia. Bull. de l'Acad. de Méd., v. 77, p. 97. 17.
- Bahn, C. A.** Ocular Complications of Measles. New Orleans Med. and Surg. Jour., v. 69, p. 745. 222, 238.
- Bailey, H.** Chronic Conjunctivitis (Plasma Cellularis). Ann. of Ophth., v. 26, p. 507. 36.
- Bailliant, P.** Retinal Arterial Circulation and Arterial Tension in Central Artery. Ann. d'Ocul., v. 154, p. 257. 103.
- Ballantyne, A. J.** Eye Symptoms and their Interpretation. Glasgow Med. Jour., Nov., 1916, p. 257. 6.  
Quinin Amaurosis. (Bibl.) Brit. Jour. Ophth., v. 1, p. 153. 121.
- Bane, W. C.** Convergent Squint. Colo. Ophth. Soc., Nov., 1917. Ophth. Rec., v. 26, p. 97. 28.  
Glaucoma Simplex. Colo. Ophth. Soc., March, 1917. Ophth. Rec., v. 26, p. 306. 84.  
Cyst of Dural Sheath of Optic Nerve. (4 ill.) Amer. Jour. Ophth., v. 1, p. 17. 191.  
Foreign Body. Ann. of Ophth., v. 26, p. 359. 206.  
Tuberculosis of Retinal Vessels. Ann. of Ophth., v. 26, p. 360. 522. 109.
- Bardsley, P. C.** Retinal Signs of Arteriosclerosis Compared with those Due to Increased Blood Pressure. Brit. Jour. Ophth., v. 1, p. 239. 107.
- Bargy, M.** Inverted Vision. Clin. Opht., v. 21, p. 606. Amer. Jour. Ophth., v. 34, p. 43. 115.
- Barkan, H.** Treatment of Glaucoma. (Bibl. Dis.) Amer. Jour. Ophth., v. 34, p. 247. 85.  
Common Ocular Injuries. Calif. State Jour. Med., v. 15, p. 270. 215.  
Ocular Defects in Mentally Retarded Children. Calif. State Jour. Med., v. 16, p. 183. 221.
- Barraquer, I.** Ideal Extraction of Cataract. Arch. de Oftal. Hisp.-Amer., v. 17, p. 252. 274. 94.
- Barraquer, I., and Anduyned.** Suction Extraction of Cataract in Toto. (6 ill.) Clin. Opht., v. 22, p. 328. 94.
- Bartels.** Use of Magnet on the Field for Ocular Injuries. Münch. med. Woch., v. 63, p. 1742. 210.
- Bassoe, P., and Raulston.** Hemianopsia with Necropsy. Jour. Nerv. and Ment. Dis., v. 44, p. 254. 142.
- Basterra y Santa Cruz.** Ethylhydrocuprein in Ophthalmology. Arch. de Oft. Hisp.-Amer., v. 17, p. 462. 10.  
Corneal Anomaly. (Bilateral Embryotoxon.) (2 ill.) Arch. de Oft. Hisp.-Amer., v. 17, p. 538. 50.
- Bates, W. H.** Blindness Relieved by "Central Fixation." New York Med. Jour., v. 105, p. 200. 134.
- Beaumont, W. M.** Spiral Fields of Vision and Neurasthenia. Lancet, Oct. 20, p. 624. 5.
- Beauvieux.** Visual Disturbances from Shot Wounds of Cortex. (63 ill.) Arch. d'Opht., v. 35, pp. 410, 560. 617. 138, 248.
- Beck, J. C.** Interrelation between Eye, Ear, Nose and Throat, Chicago Ophth. Soc., Feb., 1917. Ann. of Ophth., v. 26, p. 322. Ophth. Rec., v. 26, p. 265. 230.
- Becker, H. M.** Hydrophthalmos. Penn. Med. Jour., v. 20, p. 549. 81.

- Bedell, A. J.** Oxycephalus. (20 ill.) Sec. on Ophth. Amer. Med. Assn., 1917, p. 167. 141.  
Traumatic Pulsating Exophthalmos. Amer. Jour. Ophth., v. 1, p. 311. 175.
- Begle, H. L.** Traumatic Transplantation of Cilia into Anterior Chamber. Arch. of Ophth., v. 46, p. 47. 208.
- Behr.** Temporal Crescent Homonymous Hemianopsia. Klin. M. f. Augenh., v. 56, Pt. 2-3. 138.
- Belgeri, F., and Labat, J. C.** Sudden Blindness from Intestinal Hemorrhage. Semana Med., Buenos Aires, v. 23, p. 709. 158.
- Bell, G. H.** Unilateral Optic Atrophy in Child Eight Years Old. (Dis.) Arch. of Ophth., v. 46, p. 273. 132.  
Primary Sarcoma of Iris. (1 pl.) Trans. Amer. Ophth. Soc., v. 46, p. 427. 187.
- Belot, J., and Fraudet, H.** Localization of Foreign Bodies in Eye. Abst. Jour. Amer. Med. Assn., v. 68, p. 1786. 208.
- Berg.** Retino-choroidal Sarcoma. Wien. med. Woch., 1916, p. 1342. 190.
- Bernheim, P.** Simulated Blindness, Psychic Blindness and Autosuggestion. Rev. Gen de Clin. et de Therap., v. 30, p. 609. 6.
- Bernstein, E. J.** Unusually Long Open Wound after Cataract Extraction. Ann. of Ophth., v. 26, p. 265. 96.  
Amaurotic Family Idiocy. Med. Rec., v. 92, p. 1074. 114.  
Painless and Bloodless Removal of Chalazion. Jour. Amer. Med. Assn., v. 68, p. 532. 170.
- Berrisford, P. D.** Contusion Bulbi with Annular Lens Opacity and Macular Hole. (3 ill.) St. Paul Med. Jour., v. 19, p. 263. 196.
- Berry, G. A.** Color Sense, Phenomena and Influences. Tr. Ophth. Soc. United Kingdom, v. 37, p. 5. 146.
- Berry, G. L.** Effect of Movies on Eye Muscles. Public Health, Nov., 1916. 24.
- Besenbauch,** Optic Neuritis from Paint Fumes. Abst. Med. Rec., Dec. 30, 1917, p. 1177. 123.
- Best.** Ophthalmoscopic Lesions in Skull Wounds. Heidelberg Ophth. Cong., 1916. Ann. d'Ocul., v. 154, p. 164. 1.
- Bielschowsky.** Disorders of Ocular Movements Following War Wounds. Heidelberg Ophth. Cong., 1916. Arch. of Ophth., v. 46, p. 603. 26.
- Billström, J.** Word Blindness. Svenska Lakär. Handl., v. 43, p. 571. 134.
- Birch-Hirschfeld, A.** Hemeralopia in Soldiers. Deut. med. Woch., 1916. No. 42. Ann. of Ophth., v. 26, p. 126. 117.  
Optic Neuritis with Empyema of Ethmoid. Med. Klin., 1916, p. 427. Arch. of Ophth., v. 47, p. 89. 130.  
Laceration of Optic Disc by Rifle Shot. Zeit. f. Augenh., v. 34, p. 289. Ophthalmology, v. 13, p. 487. 212.
- Birch-Hirschfeld, G.** Ocular Symptoms in Disseminated Sclerosis. Klin. M. f. Augenh., Sept.-Oct., 1917. Brit. Jour. Ophth., v. 2, p. 237. 232.
- Blaauw, E. E.** Binocular Single Vision, Leaving out Color Perception and Strabismus. Sec. on Ophth. Amer. Med. Assn., 1917, p. 49. 22.
- Black, M.** New Cataract Knife and Knife for Dacryorhinostomy. (2 ill.) Ophth. Rec., v. 26, p. 77. 13.  
Uveitis. Colo. Ophth. Soc., Feb., 1917. Ann. of Ophth., v. 26, p. 353. Ophth. Rec., v. 26, p. 294. 61.  
Result 26 Years After Cataract Extraction. Colo. Ophth. Soc., Dec., 1917. Amer. Jour. Ophth., v. 1, p. 142. 87. 97.  
Massive Retinal Exudate. Amer. Jour. Ophth., v. 1, p. 120. 109.  
Dacryocystitis. Colo. Ophth. Soc., Feb., 1917. Ann. of Ophth., v. 26, p. 354. 161.  
Ectropion of Lower Lid. Colo. Ophth. Soc., Dec., 1917. Ann. of Ophth., v. 26, p. 333. Ophth. Rec., v. 26, p. 157. 172.  
Traumatic Conjunctival Hemorrhage. Ann. of Ophth., v. 26, p. 335. 198.  
Laceration of Cornea. Ann. of Ophth., v. 26, p. 352. 199.  
Traumatic Dislocation of Lens. Amer. Jour. Ophth., v. 1, p. 141. 199.
- Blackburn, W. J.** Treatment of Incipient Senile Cataract. Jour. Ophth. Otol. and Laryngol. Nov., 1917, p. 726. 91.
- Blake, E. E.** Reattachment of Retina-Trephine Operation. Ophth. Rec., v. 26, p. 562. 120.  
Complete Bilateral Ophthalmoplegia with Choked Discs. Ophth. Rec., v. 26, p. 74. 127.
- Blanco, T.** Necessity for Ophthalmoscopic Examination before Use of Arsenic Preparations. Arch. d'Opht., v. 35, p. 478. Brit. Jour. Ophth., v. 1, p. 582. Ann. of Ophth., v. 26, p. 470. 1, 226.  
Skiascopy Explained. (4 ill.) Arch. de Oft. Hisp.-Amer., v. 17, p. 169. Ann. of Ophth., v. 26, p. 471. 14.  
Iridectomy in Extraction of Senile Cataract. Arch. de Oft., Hisp.-Amer., Oct., 1916. Brit. Jour. Ophth., v. 1, p. 318. 93.  
Osteoma of Orbit. Arch. de Oft. Hisp.-Amer., v. 17, p. 181. Ann. of Ophth., v. 26, p. 471. 193.
- Bloch, C. E.** Xerophthalmia in Infants. Ugeskrift for Laeger, v. 79, p. 279. 309. vol. 80, p. 815. Abst. Jour. A. M. A., v. 68, p. 1516. 48, 230.
- Blum, H. M.** Hypophyseal Disease. New Orleans Med. and Surg. Jour., v. 70, p. 583. 143.
- Boehm.** Eye Injuries from Bursting Shell. Klin. M. f. Augenh., July-Aug., 1916. Amer. Jour. Ophth., v. 34, p. 180. 200.
- Bollack.** Local Eosinophilia in Induced Conjunctivitis. La Presse Méd., Jan. 4. Med. Rec., March 3, 1917, p. 382. 35.
- Bonacker, A. A.** Thrombosis of Cavernous Sinus Complicated by Mastoiditis. Arch. d'Opht., v. 35, p. 444. 181.
- Bonnefon, G., and Fromaget, H.** Aseptic Resection of Sclera. Ann. d'Ocul., v. 154, p. 505. 53.



- Boot, G. W.** Angioma of Orbit. (Dis.) Amer. Jour. Ophth., v. 1, p. 350. 193.
- Disease of Cavernous Sinus. Jour. Ophth. and Oto-Laryngology, v. 11, p. 56. 231.
- Bordley, J., Jr.** Reeducation of the War Blinded. Jour. Amer. Med. Assn., v. 70, p. 1931. 243.
- Boström, C. G., Göthlin, G. F. and Ohrvall, H. J.** Examination of Color Blindness. Upsala Läkär Forhandl., v. 22, p. 23. 149.
- Botteri, A.** Spring Catarrh. Wien. klin. Woch., 1916. Arch. of Ophth., v. 47, p. 92. 35.
- Anomalies of Eye Ground in New Born. Wien. kl. Woch., 1916. No. 18. 102.
- Bourdiar, Penetrating Wounds of Globe.** Presse Méd., 1916, p. 522. Amer. Jour. Ophth., v. 34, p. 224. 216.
- Bowman, F. B.** Vincent's Infection Involving Eyes. Lancet, Oct. 6, 1917, p. 536. 224.
- Boyd, E. T.** Nystagmus. Ophth. Rec., v. 26, p. 99. 30.
- Congenital Band in Vitreous. Ophth. Rec., v. 26, p. 99. 101.
- Steel in Posterior Lens Capsule. Ophth. Rec., v. 26, p. 471. 203.
- Boys, A. H.** Collosol Argentum for Corneal Ulcers. Brit. Jour. Ophth., v. 1, p. 330. 47.
- Bradburne, A. A.** Treatment and Prognosis of Chronic Glaucoma. Ophthalmology, v. 13, p. 204. 86.
- Brandeis, J. W.** Amaurotic Family Idiocy. (1 ill.) New York Med. Jour., v. 107, p. 121. 114.
- Brannick, C.** Possibilities of Social Service Work in Eye Hospital, etc. Modern Hosp., v. 9, p. 19. 252.
- Braunschweig.** Examination of Light Sense. Münch. med. Woch., v. 63, p. 1400. 117.
- Brav, A.** Accidental Instillation of Corrosive Sublimat in Conjunctival Sac. New York Med. Jour., v. 106, p. 1027. 196.
- Brawley, F.** "Ophthalmic Record" in Chicago. Amer. Jour. Ophth., v. 1, p. 206. 253.
- Briggs, H. H.** Tendon Shortening. (3 ill.) Sec. on Ophth., A. M. A., 1917, p. 260. South. Med. Jour., v. 10, p. 686. 25.
- Brinkerhoff, N. M.** Wassermann Findings in Ophthalmic Disease. Amer. Jour. Ophth., v. 1, p. 322. 224.
- Bronson, E.** Fragilitas Ossium and Blue Scleras. Edinb. Med. Jour., v. 18, p. 240. Amer. Jour. Ophth., v. 34, p. 154. 52.
- Brose, L. D.** Ocular Tuberculosis. Jour. Indiana State Med. Assn., v. 11, p. 113. 228.
- Brown, E. V. L.** Sympathetic Ophthalmia with Anatomic Findings. Ophth. Rec., v. 26, p. 313. Amer. Jour. Ophth., v. 1, p. 66. 76, 78.
- See Irons, E. E.
- Brownell, M. E.** Cataract Delirium. Jour. Mich. State Med. Soc., v. 16, p. 282. 97.
- Brownfield, R. R.** Acute Pneumococcus Conjunctivitis, Fatal Termination from Meningitis. Ophth. Rec., v. 26, p. 516. 32.
- Browning, S. H.** Treatment of Syphilis with Newer Remedies. Tr. Ophth. Soc. United Kingdom, v. 36, p. 29. 226.
- Broyles, C. J.** Inflammation of Conjunctiva Resembling Trachoma. Jour. Tenn. State Med. Assn., v. 10, p. 73. 37.
- Bruder, J.** Retrobulbar Neuritis following Ethmoiditis. Arch. of Ophth., v. 46, p. 271. 129.
- Bruner, W. E.** Headache of Ocular Origin. Cleveland Med. Jour., v. 16, p. 549. 19.
- Brunetière and Amalric.** Hemorrhage into Scleral Wound. Suture of Sclera. Cure. Clin. Opht., v. 22, p. 267. Amer. Jour. Ophth., v. 1, p. 274. 202.
- Bryan, J. H.** The Eye and Accessory Sinuses Ann. Otol. Rhin. and Laryngol., v. 25, p. 618. 230.
- Buchanan, L.** Opaque Nerve Fibres. (4 ill.) Tr. Ophth. Soc. United Kingdom, v. 37, p. 166. 125.
- Metal Embedded in Lens, Normal Vision Regained after Nine Months. Brit. Jour. Ophth., v. 1, p. 246. 203.
- Bulson, A. E., Jr.** Conservative Treatment of Penetrating Wounds of Eyeball. Jour. Indiana State Med. Assn., v. 10, p. 307. 201.
- Burge, W. E.** Cause of Cataract. Amer. Jour. Physiol., v. 12, p. 615. 88, 195.
- Injurious Effect of Ultraviolet Radiation on Living Tissue. Abst. Bull. Nela Research, Nat'l Lamp Works, Cleveland, Ohio, 1917, p. 290. 89, 237.
- Burger, H.** Orbital Inflammation. Arch. d'Opht., v. 35, p. 444. 180.
- Study of Claude Bernard-Horner Syndrome. Arch. Méd. Belges, April, 1917. Brit. Jour. Ophth., v. 1, p. 763. 233.
- Burke, H. A.** Value of Blood Pressure in Ophthalmoscopic Findings in Head Injuries. Int. Jour. Surg., v. 29, p. 404. 6.
- Burkholder, C. A.** Hole at Macula. (1 pl. Bibl.) Amer. Jour. Ophth., v. 1, p. 81. 115.
- Burns, H. R.** Marginal Serpentine Ulcer. Colo. Ophth. Soc., Jan., 1917. Ann. of Ophth., v. 26, p. 344. Ophth. Rec., v. 26, p. 255. 47.
- Optic Atrophy. Ann. of Ophth., v. 26, p. 333. Ophth. Rec., v. 26, p. 158. 131.
- Eye Injury. Ann. of Ophth., v. 26, p. 525. Ophth. Rec., v. 26, p. 475. 202.
- Burns, J. C.** Dermoid Cyst of Orbit. Edinb. Med. Jour., v. 17, p. 165. Brit. Jour. Ophth., v. 1, p. 384. 178.
- Buti, G.** Modification of Regulations Regarding Ocular Disabilities for Military Service. Arch. di Ottal., v. 24, p. 141.
- Butler, T. H.** Spring Catarrh. Diagnosis and Radium Treatment. Brit. Jour. Ophth., v. 1, p. 411. 36.
- The Ring Magnet. (3 ill. Bibl.) Brit. Jour. Ophth., v. 1, p. 46. 210.
- Buxton, L. H.** Dumb-bell Keratitis. Ophthalmology, v. 13, p. 450.
- Byers, W. G. M.** Elliot's Operation in Glaucoma. New York State Jour. Med., v. 17, p. 545. 86.
- Cabaut, Filaria Loa.** Bol. de la Soc. Oftal. de Buenos Aires, v. 4, p. 33. 236.



- Caillaud, M.** Traumatic Bilateral Pulsating Exophthalmos. (1 ill.) *Arch. d'Opht.*, v. 35, p. 746. 174.
- Calderaro.** Extirpation of Lacrimal Gland. (9 ill. Bibl.) *Ann. di Ottal.*, v. 40, p. 35. *Abst. Ophth. Lit.*, v. 7, p. 93. 159.
- Echinococcus of Orbit.** (3 ill.) *Arch. di Ottal.*, v. 23, p. 411. *Brit. Jour. Ophth.*, v. 1, p. 565. 180.
- Excision of Tumor of Orbit without Enucleation.** *Policlinico*, v. 24, p. 40. 192.
- Calhoun, F. P.** Visual Fields in Pellagra. (Ill.) *Ophth. Rec.*, v. 26, p. 63. 141.
- Removal of Foreign Body from Globe by Electromagnet.** *Jour. Med. Assn. of Georgia*, v. 6, p. 213. 211.
- Antityphoid Inoculations and Ocular Disease.** *Ophth. Rec.*, v. 26, p. 553. 222.
- Camp, C. D.** Hysterical Blindness. *Jour. Mich. State Med. Soc.*, v. 16, p. 470. 142.
- Campbell, J. A.** Enucleation of Eye After Injury. *Jour. Ophth. Otol. and Laryngol.*, June, 1917, p. 401. 210.
- Perforating Gun-shot Wounds of Eye.** *Jour. Ophth. Otol. and Laryngol.*, Oct., 1917, p. 689. 210.
- Campbell, M. G.** Electrotherapy in Treatment of Cataract. *Amer. Jour. Electrotherap. and Radiol.*, v. 35, p. 357. 92.
- Campos, E.** Bullous Keratitis from Asphyxiating Bombs. *Ann. d'Ocul.*, Dec., 1915. *Brit. Jour. Ophth.*, v. 1, p. 112.
- Cantonnet, A.** Eyelash Driven into Anterior Chamber. *Progrès Méd.*, v. 42. 398. *Brit. Jour. Ophth.*, v. 2, p. 337.
- Writing for the Blind.** (5 ill.) *Arch. d'Opht.*, v. 35, p. 605. *Brit. Jour. Ophth.*, v. 1, p. 761. *Ann. of Ophth.*, v. 26, p. 634. 242.
- Cantonnet, A., and St. Martin.** Gumma of Orbit. *Arch. d'Opht.*, v. 35, p. 692. 181.
- Carhart, W. M.** Refractive Errors Causing Retardation in School. *New York Med. Jour.*, v. 106, p. 309. 19.
- Diagnosis and Treatment of Trachoma.** *Med. Rec.*, v. 91, p. 16. 38.
- New York Children's Eye Clinic.** *Modern Hosp.*, Sept., 1917, p. 171. 251.
- Carlotti and Bailloul.** Improving Appearance and Motility of Artificial Eyes. *Ann. d'Ocul.*, v. 152, p. 401. *Brit. Jour. Ophth.*, v. 1, p. 707. 182.
- Carpenter, E. R.** Enucleation of Eyeball and Sympathetic Inflammation. *Med. Press*, v. 114, p. 392. 156.
- Carr, A. M.** Acute Inflammatory Glaucoma Relieved by Eserin. *Ophth. Rec.*, v. 26, p. 309. 84.
- Tension in Normal Eyes.** *Ann. of Ophth.*, v. 26, p. 509. 84.
- Carrasco, E. A.** Radical Extirpation of Lacrimal Sac. (110 Cases.) *Bol. de la Soc. de Oftalm. Buenos Aires*, v. 4, p. 373. 163.
- Ophthalmic Practice at Rosario.** *Bol. de la Soc. Oftalm. de Buenos Aires*, v. 4, p. 402.
- Carson, W. E.** Visual Requirements of the United States Navy. (2 ill.) *Jour. Amer. Med. Assn.*, v. 71, p. 263. 247.
- Carter, B. R.** Appearance of Color Spectra to Aged. *Lancet*, Dec. 18, 1917, p. 867. 150.
- Casolino, L.** Lymphosarcoma of Bulbar Conjunctiva. (5 pl.) *Arch. di Ottal.*, v. 23, p. 383. 186.
- Castañer Marti, J.** Treatment of Cataract. *Arch. de Oftal. Hisp.-Amer.*, v. 17, p. 38. 91, 94.
- Castex, M.** Rare Ophthalmoplegia of Central Origin. *Rev. Asoc. Med. Argent.*, Buenos Aires, v. 23, p. 64. 29.
- Castresana, B.** Dermoid Tumor of Eyelid. *Siglo Med.*, 64, p. 446. 184.
- Diagnosis of Sarcoma of Choroid.** (7 ill.) *Arch. de Oftal. Hisp.-Amer.*, v. 17, p. 426. *Ophth. Lit.*, v. 7, p. 118. 188.
- Ceccheto, E.** Retrobulbar Fibroma. (4 ill.) *Ann. di Ottal. e Clin. Ocul.*, v. 1, p. 307. 192.
- Chalmers, A. K.** Blindness from Venereal Disease in Glasgow. *Brit. Jour. Ophth.*, v. 1, p. 398, 585. 224.
- Chamberlin, W. B.** Endonasal Operation on Lacrimal Sac. *Sec. on Ophth. A. M. A.*, 1917, p. 177. 162.
- Chance, B.** Herpes Zoster Ophthalmicus. *Wills Hosp. Ophth. Soc.*, Oct., 1916. *Ophth. Rec.*, v. 26, p. 47. 44.
- Defect of Iris. Polycoria.** *Ann. of Ophth.*, v. 26, p. 219. 59.
- Atrophy of Choroid.** *Ophth. Rec.*, v. 26, p. 468. 74.
- Ocular Disturbances in Pregnancy.** *Ophth. Rec.*, v. 26, p. 346. 111.
- Hole at Macula.** *Sec. on Ophth. Coll. Phys., Phila.*, Feb., 1917. 115.
- Detached Retina.** *Ophth. Rec.*, v. 26, p. 467. 120.
- Involvement of Ocular Structures in Lupus Vulgaris.** *Ann. of Ophth.*, v. 26, p. 246. 169.
- Probable Conjunctivitis with Infiltration of Orbital Tissues.** *Ophth. Rec.*, v. 26, p. 54. 179.
- Operation for Repair of Contracted Socket.** *Ann. of Ophth.*, v. 26, p. 220.
- Lacerated Wound of Eyelids and Cornea.** *Ophth. Rec.*, v. 26, p. 54. 202.
- Ophthalmic Examination of Drafted Men at Camp Jackson.** *Amer. Jour. Ophth.*, v. 1, p. 511, 318. 245.
- Chapman, V. A.** How shall We Determine Indemnities Following Injuries to Eyes. (4 ill.) *Wisconsin Med. Jour.*, v. 17, p. 54. 248.
- Chappé, T.** Opportune Operations. *Ann. d'Ocul.*, v. 154, p. 245. 13.
- Charles, J. W.** Optic Nerve and Sinus Involvement with Diminution of Vision after Salvarsan. *Amer. Jour. Ophth.*, v. 34, p. 40. 132.
- Dental Stigmata of Syphilis and Demonstration of Hutchinson's Teeth.** (1 ill.) *Amer. Jour. Ophth.*, v. 34, p. 65. 225.
- Suspected Teeth and the Wassermann Reaction in Missouri School for Blind.** *Amer. Jour. Ophth.*, v. 34, p. 110.
- Thorough Examination Into Family History in Applicants for Admission to**

- Schools for Blind. Jour. Mo. State Med. Assn., v. 14, p. 430. 225.
- Charlin, C.** Syphilitic Meningitis with Bilateral Blindness. Ann. d'Ocul., v. 153, p. 490. 225.
- Chistyakoff, P.** Treatment of Ulcer of Cornea with Zinc Sulphat. Sibirsk Vrach, 1916, p. 261.
- Cysticercus of Eyelid. Sibirsk Vrach, p. 255. 235.
- Christian, H. A.** Ocular Symptoms in Polycythemia. Amer. Jour. Med. Sc., v. 154, p. 547. 229.
- Church, B. F.** Sarcoma of Choroid. Calif. State Med. Jour., v. 16, p. 305. 190.
- Cilleruelo.** Iridecto-sclerectomy in Glaucoma. Arch. de Oftal. Hisp.-Amer., v. 17, p. 268. Brit. Jour. Ophth., v. 1, p. 447. Ann. of Ophth., v. 26, p. 638. 85.
- Claiborne, J. H.** Buphthalmos in Child of 12 Years. (Dis.) Arch. of Ophth., v. 46, p. 165. 82.
- Foreign Body (Lead) in Vitreous. (Dis.) Arch. of Ophth., v. 46, p. 168. 210.
- Clapp, C. A.** Pneumococcus Conjunctivitis of Great Chronicity. Death. Ophth. Rec., v. 26, p. 336. 32.
- Melanosarcoma of Choroid Negative to Transillumination. Amer. Jour. Ophth., v. 34, p. 86. 189.
- Clark, W. L.** Recurrent Neuroepithelioma Springing from Optic Nerve Treated with Electrothermia Coagulation. Amer. Jour. Electrotherap. and Radiol., v. 35, p. 401. 194.
- Clarke, E.** Cycloplegics in Refraction. Med. Press, v. 103, p. 160. 17.
- Iritis. Lancet, June 23, 1917, p. 957. 65.
- Clegg, J. G.** Sclerocorneal Trephining for Hypertension. Ophth. Soc. United Kingdom, v. 37, p. 308. Brit. Jour. Ophth., v. 1, p. 532. 85.
- Clothier, J.** Conservative Treatment of Convergent Strabismus. Northwest Med., v. 16, p. 48. 25.
- Cobb, P. W., and Geissler.** Effect on Foveal Vision of Bright Surroundings. Abst. Bull. Nela Research, Nat'l Lamp Works, Cleveland, O., 1917, p. 246. 104.
- Coblentz, W. W., and Emerson, W. B.** Protective Glasses. U. S. Bureau of Standards, No. 93. Washington. 240.
- Coderque, R.** New Operation for Cataract. (5 ill.) España Oftal. May, 1917, p. 84. 96.
- Cohen, M.** Essential Shrinkage of Conjunctiva. Arch. of Ophth., v. 46, p. 65. 42.
- Eye Manifestations Complicating Fracture of Skull. Amer. Jour. Surg., v. 31, p. 183. Arch. of Ophth., v. 46, pp. 258, 279. 141.
- Panophthalmitis with Puerperal Sepsis. (Dis.) Arch. of Ophth., v. 46, p. 164. 154.
- Polycythemia. Arch. of Ophth., v. 47, p. 192. 229.
- Leukemic Manifestations in Eye. Arch. of Ophth., v. 47, p. 61. 229.
- Coleman, W. F.** Foreign Body in Eye, Magnet Operation. Jour. Ophth. Otol. and Laryngol. Jan, 1917, p. 26. 209.
- Colin, A.** Simple Extraction of Cataract with Suture of Cornea. (5 ill.) Ann. d'Ocul., v. 154, p. 457. 93.
- Collins, E. T.** Hypotony. Trans. Ophth. Soc. United Kingdom, v. 37, p. 281. 80.
- Zonular Opacity of Lens, Persistent Pupillary Membrane. (1 pl.) Trans. Ophth. Soc. United Kingdom, v. 36, p. 403. 88.
- Subconjunctival Hemorrhage from Concussion, Relation to Commotio Retinae, Hole at Macula, etc. (1 col. pl. Bibl.) Tr. Ophth. Soc. United Kingdom, v. 37, p. 112. 105.
- Small Tortuous Veins on Optic Disc with Small Vascular Nevi of Skin of Eyelid and Nasal Septum. (1 ill.) Tr. Ophth. Soc. United Kingdom, v. 37, p. 171. 125.
- See **Lawson, A.**
- Collins, J.** Ocular Appearances in Chronic Nephritis. Abst. Amer. Jour. Ophth., v. 34, p. 191. 126.
- Nervous Manifestations of Ocular Syphilis. Amer. Jour. Med. Sc., v. 155, p. 649. 225.
- Compère, D. E.** Effect of Harnessing up Indirect Vision. Amer. Jour. Ophth., v. 34, p. 33. 134.
- Comstock, C. E.** What the State of Illinois is Doing for Its Blind. Modern Hosp., v. 9, p. 80. 244.
- Condorelli-Francaviglia.** Provoked Catarrhal Conjunctivitis by Use of Ricinus. Policlinico, v. 24, p. 735. 34.
- Conlon, F. A.** Essential Shrinkage of Conjunctiva in Pemphigus. Boston Med. and Surg. Jour., v. 177, p. 206. 42.
- Coover, D. H.** Tuberculosis of Conjunctiva. Colo. Ophth. Soc., Feb., 1917. Ann. of Ophth., v. 26, p. 361. 41.
- Fibroma of Orbit. Amer. Jour. Ophth., v. 1, p. 341. 192.
- Corry, M., and Shanker, R. P.** Eye Strain. Ophthalmology, v. 13, p. 557. 20.
- Old and New Cataract Operations. Ophthalmology, v. 13, pp. 169, 420. 96, 97.
- Cosse, and Delord.** Conjunctivitis with Dysentery. Ann. d'Ocul., v. 154, p. 33. Brit. Jour. Ophth., v. 1, p. 185. 34.
- Conjunctivitis from Ipecac, Pepper and Tobacco. Ann. d'Ocul., v. 154, p. 152. 41.
- Right Homonymous Hemianopsia with Left Quadrant Anopsia. Ann. d'Ocul., v. 154, p. 118. 139.
- The War Blind, Education and Future. Ann. d'Ocul., v. 154, p. 307. 242.
- Visual Troubles from Cranial Wounds. Arch. d'Ophth., v. 35, p. 539. 249.
- Coulter, R. J.** Medico-legal Interest of Binocular Keratitis after Injury. Brit. Jour. Ophth., v. 2, p. 139. 248.
- Cousin, G.** Sympathetic Ophthalmia After Injury. Arch. d'Ophth., v. 35, p. 362. Brit. Jour. Ophth., v. 1, p. 504. 78.
- Prosthesis of Orbit. Arch. d'Ophth., v. 35, p. 694. 183.
- Coutela.** Visual Troubles from Wounds of Cranium. Soc. d'Ophth. de Paris, May, 1917. Ann. d'Ocul., v. 154, p. 313.



- Cozzoli, G.** Traumatic Thrombosis of Central Retinal Vein. (1 pl. Bibl.) Arch. di Ottal., v. 23, p. 369. 111.
- Cramer, E.** Tuberculous Optic Neuritis. (2 ill.) Klin. M. f. Augenh., v. 60, p. 566. 227.
- Crawford, J. M.** Why a Cycloplegic and Mydriatic as a Routine. Southern Med. Jour., v. 10, p. 758. 17.
- Crawford, J. P.** Treatment of Trachoma with Bulgarian Bacillus Culture. Jour. Tenn. State Med. Assn., v. 6, p. 71. 38.
- Cridland, B.** Schiötz Tonometer. Brit. Jour. Ophth., v. 1, p. 352. 2.
- Crigler, L. W.** Extension Exudation with Deep Layers of Retina. (Dis.) Arch. of Ophth., v. 46, p. 274. 109.
- Steel in Vitreous Unaccompanied by Inflammation, or Loss of Useful Vision. Arch. of Ophth., v. 46, p. 273. 209.
- Crisp, W. H.** Combined Use of Crossed Cylinder and Astigmatic Dial. Ann. of Ophth., v. 26, p. 42, 150. 15.
- Paralysis of External Rectus. Ophth. Rec., v. 26, p. 302. 28.
- Abscess of Caruncle. Amer. Jour. Ophth., v. 1, p. 344. 163.
- History of Operation for Cataract. Ann. of Ophth., v. 26, p. 585. 254.
- Crisp, W. H. and Finnoff, W. C.** Epithelioma at Limbus. Tr. Acad. Ophth. and Oto. Laryngol., 1916, p. 118. 186.
- Cross, F. R.** Kerato-iritis Cured by Tuberculin. Trans. Ophth. Soc. United Kingdom, v. 36, p. 282. Brit. Jour. Ophth., v. 1, p. 331. 50.
- Symmetrical Proptosis of Both Eyes. Lymphoma (?) Trans. Ophth. Soc. United Kingdom, v. 36, p. 253. 174.
- Cruise, R. R.** Protection of Eyes in Warfare. (1 ill.) Brit. Jour. Ophth., v. 1, p. 489. Trans. Ophth. Soc. United Kingdom, v. 37, p. 176. 240, 246.
- Crzellitzer.** Disturbance of Adaptation. Klin. M. f. Augenh., July, Aug., 1916, p. 191. 117.
- Cuénod, A.** Pathogenesis and Treatment of Ciliary Blepharitis. Clin. Opht., v. 22, p. 210. Ann. of Ophth., v. 26, p. 636. 166.
- Cuevas Pulido.** Ocular Manifestations of Leprosy. Arch. de Oft. Hisp.-Amer., v. 17, p. 519. 228.
- Curry, G. E.** Melanotic Sarcoma. Penn. Med. Jour., v. 21, p. 121. 194.
- Curtin, T. H.** Relief of Detachment of Retina. Arch. of Ophth., v. 46, p. 369. 118.
- Cutler, C. W.** Ocular Work and Rest in Childhood. Arch. of Pediat., v. 34, p. 50. 239.
- Strabismus. Med. Rec., v. 91, p. 613. 25.
- Dabney, S. G.** Treatment of Corneal Ulcers. Ophth. Rec., v. 26, p. 21. 46.
- Daland, J.** Eskimo Snow Blindness and Goggles. Sec. on Ophth. Coll. Phys of Phila., April, 1916. Ophth. Rec., v. 26, p. 116. 238.
- Relation of Ductless Glands to Arterial Diseases. Med. Rec., v. 91, p. 84. 229.
- Darier, A.** Cocain Colloidal in Ocular Syphilis. Clin. Opht., v. 22, p. 94, 195. 10.
- General Medicaments. Clin. Opht., v. 21, p. 579. Amer. Jour. Ophth., v. 34, p. 8. 10.
- Treatment of Diseases of Iris and Ciliary Body. Clin. Opht., v. 22, p. 3. Amer. Jour. Ophth., v. 34, p. 261, 466, 301. 71, 72.
- Melanosarcoma of Orbit. (2 ill.) Clin. Opht., v. 21, p. 559. Ann. of Ophth., v. 26, p. 464. Brit. Jour. Ophth., v. 1, p. 582. 194.
- Darling, C. G.** Operation for Anterior Synechiae, Secondary Glaucoma and Staphyloma. Ophth. Rec., v. 26, pp. 83, 206. 51.
- Sympathetic Ophthalmia. Ophth. Rec., v. 26, p. 233. 77, 78.
- Davies, D. L.** Diseases of Eye of Obscure Origin. Trans. Ophth. Soc. United Kingdom, v. 37, p. 220. Brit. Jour. Ophth., v. 1, p. 608. 61.
- Anophthalmia and Microphthalmia. (4 ill.) Brit. Jour. Ophth., v. 1, p. 415. 152.
- Dean, W. L.** Disease of Cavernous Sinus. Jour. Ophth. and Oto-Laryngol., v. 11, p. 52. 231.
- De Boe,** Eye from Standpoint of General Practitioner. Jour. Florida Med. Assn., v. 4, p. 357. 234.
- Dehogues, J. L.** Hemeralopia in Cuba. Arch. de Oft. Hisp.-Amer., v. 17, p. 424. Ophth. Lit., v. 7, p. 119. 118.
- Delmiro de Caralt.** Morphology, Pathogenesis and Treatment of Scleritis. España Oft., v. 2, pp. 33, 57. Ann. of Ophth., v. 26, p. 302. 52.
- Del Monte, A.** Etiology and Pathogenesis of Chalazion. (3 ill.) Ann. d'Ocul., v. 154, p. 607. 170.
- Delorme.** Preparation of Vaccine of Nicolle and Blaziot. Brit. Jour. Ophth., v. 1, p. 455. Ann. of Ophth., v. 26, p. 137. 32.
- Demaria, E. B.** Irido-cyclo-choroiditis and Vitiligo. Arch. de Oft. Hisp.-Amer., v. 17, p. 355. Brit. Jour. Ophth., v. 1, p. 689. Ann. of Ophth., v. 26, p. 641. 68.
- Endocular Hydatid Cyst. (4 ill.) Bol. de la Soc. Oftal. Buenos Aires, v. 4, p. 41, 405. 235.
- Demaria, E. B. and Caldora, B.** Associated Movements of Upper Lid with Mastication. Bol. de la Soc. Oftal. Buenos Aires, v. 4, p. 70. Amer. Jour. Ophth., v. 1, p. 687. 164.
- Denig, R.** Transplantation of Mucous Membrane of Mouth for Burns of Cornea. (150 Cases.) Arch. of Ophth., v. 1, p. 309. 195.
- Derby, G. S.** Ophthalmic Notes from Base Hospital No. 5 in France. Ophth. Rec., v. 26, p. 536. 35.
- Interstitial Keratitis. Sec. on Ophth. A. M. A., 1917, p. 230. 49.
- Derby, G. S., and Verhoeff, F. H.** Sarcoid of Eyelid. (3 ill. Bibl.) Arch. of Ophth., v. 46, p. 312. 184.
- Dernehl, P. H.** Etiology of Primary Glaucoma. Wisconsin Med. Jour., v. 16, p. 79. 83.
- Desogus, R.** Melanotic Sarcoma of Choroid. Tumori, Rome, April, May, 1917, p. 148. 189.



- Des Voeux, H. A.** Eye Strain and General Practice. *Lancet*, March 9, 1918, pp. 327, 378. 233.
- Detwiler.** Physiology of the Eye. *Brit. Jour. Opth.*, v. 1, p. 436. 104.
- Dianoux.** Inexpedient Enucleations. *Clin. Opht.*, v. 22, p. 92. *Brit. Jour. Opth.*, v. 1, p. 762. *Ann. of Opth.*, v. 26, p. 632. 155.
- Diaz Rodriguez, S.** Iodid of Silver in Ophthalmology. *España Oftal.*, v. 2, p. 46. 10.
- Dimitry, T. J.** Non-Specific Protein in Ophthalmology. *New Orleans Med. and Surg. Jour.*, v. 70, p. 231. 7.
- Mechanical Manipulation of Tarsus, a Cure for Trachoma. *Texas Med. Rec.*, 1917. 40.
- Enucleation and Evisceration of Eyeball. (2 ill. Dis.) *Southern Med. Jour.*, v. 10, p. 594. 155.
- Suggestions for Improved Prothesis. (9 ill.) *Ann. of Opth.*, v. 26, p. 268. 156.
- Dimmer, F.** Sympathetic Ophthalmia and War. *Klin. M. f. Augenh.*, Sept.-Oct., 1916. 77.
- Distler and Neunhoeffer.** Wounds of Eye. *Deut. med. Woch.*, 1916, p. 494. *Arch. of Opth.*, v. 46, p. 606. 208.
- Dixon, G. S.** Radiography of Eye and Orbit. *New York State Jour. Med.*, v. 17, p. 67.
- Dobson, L.** Acute Infective Ophthalmoplegia or Botulism. *Lancet*, April 27, 1918, p. 615. 223.
- Dodd, O.** Unilateral Exophthalmos. *Chicago Opth. Soc.*, Nov., 1917. *Amer. Jour. Opth.*, v. 1, p. 140. 175.
- Dodge, R.** Visual Motor Functions. *Psychol. Bull.*, Princeton, v. 13, p. 421. 21.
- Dolcet.** Renal Retinitis. *España Oftal.*, v. 2, p. 56. 112.
- Dolger.** Orbital Abscess after Suppuration of Ethmoid Cells. *Munch. med. Woch.*, v. 63, p. 1548. 180.
- Dor, L.** Retrobulbar Optic Neuritis. *Clin. Opht.*, v. 22, p. 264. *Amer. Jour. Opth.*, v. 1, p. 127. 126.
- Enucleation and Evisceration. *Clin. Opht.*, v. 22, p. 204. *Ann. of Opth.*, v. 26, p. 635. 156.
- Intractable Foreign Bodies. *Clin. Opht.*, v. 22, p. 206, 707. *Brit. Jour. Opth.*, v. 1, p. 504. *Ann. of Opth.*, v. 26, p. 455. 209.
- Dorff.** Latent Nystagmus. *Ann. of Opth.*, v. 26, p. 128. 27.
- Doubler, F. H., and Marlow, S. B.** Hemorrhage into Optic Nerve Sheath, Intracranial Hemorrhage Caused by Rupture of Aneurysm. (1 ill.) *Arch. of Opth.*, v. 46, p. 533. 125.
- Dubar, L.** Paraffin Film in Dressing Eye. *Progrès Méd.*, v. 32, p. 218. 12, 13.
- Dulaney, O.** Ocular Disease from Infection in Other Parts of Body. *Jour. Tenn. State Med. Assn.*, v. 10, p. 240. 61, 64.
- Duncan, J. W.** Ptosis (Botulism) *Brit. Med. Jour.*, May 11, 1918, p. 551. 223.
- Dunlap, K.** New Measure of Visual Discrimination. *Abst.-Bull. Nela Research Nat'l*
- Lamp Works, Cleveland, O., 1917, p. 260. 4.
- Shortest Perceptible Time Interval Between Two Flashes of Light. *Abst.-Bull. Nela Research Nat'l Lamp Works*, Cleveland, O., 1917, p. 257. 104.
- Dunn, J.** Argyll-Robertson Pupil. *Arch. of Opth.*, v. 46, p. 193. 55, 56.
- Tonsils a Source of Infection in Iritis and Choroiditis. *Arch. of Opth.*, v. 46, p. 446. 63, 72.
- Probable Cause of Exophthalmic Goiter. *Arch. of Opth.*, v. 47, p. 248. 229.
- Dunn, P.** Ophthalmic Terminology, Its Solecisms and Antiquation. *Med. Press*, v. 155, p. 68. 251.
- British Masters of Ophthalmology. Sir William Adams, Benjamin Travers. (pl.) *Brit. Jour. Opth.*, v. 1, p. 273. v. 2, p. 1. 252.
- Dutoit.** Papilledema and Trephining. *Brit. Jour. Opth.*, v. 1, p. 709. 128.
- Dutrow, H. V.** Parinaud's Conjunctivitis. (1 ill.) *Trans. Amer. Acad. Opth. and Oto-Laryngol.*, 1916, p. 114. *Opht. Rec.*, v. 26, p. 171. 41.
- Duverger.** Operation for Senile Ectropion. *Arch. d'Opht.*, v. 35, p. 677. 173.
- Resection of Anterior Segment of Globe in Infancy. *Arch. d'Opht.*, v. 35, p. 705. 215.
- Two Months of Ophthalmology in Emergency War Hospitals. *Ann. d'Ocul.*, v. 154, p. 585. 215.
- Eason, H. L.** Ophthalmic Cases in Cairo and Alexandria. *Brit. Jour. Opth.*, v. 1, p. 465. 252.
- Eaton, C. M.** Determination of Posterior Foreign Bodies in Relation to Eyeball and Component Parts. (23 ill.) *Brit. Jour. Opth.*, v. 1, p. 721. 209.
- Edmondson, E. E.** Surgical Cure of Trachoma. *Ill. Med. Jour.*, v. 31, p. 230. 32.
- Krönlein Operation. *Ill. Med. Jour.*, v. 32, p. 175. 192.
- Edridge-Green, F. W.** Relation of Ophthalmology to Theory of Vision. *Brit. Jour. Opth.*, v. 1, p. 423. 146.
- Edwards, J. G.** Localization of Foreign Bodies in Eye. *Med. Jour. Australia*, 1917, p. 25. *Brit. Jour. Opth.*, v. 1, p. 571. 209.
- Edwards, S. R.** Penetrating and Nonpenetrating Injuries of Eye. *Jour. Mich. State Med. Soc.*, v. 16, p. 391. 200.
- Eleonskaia, V. N.** Cystic Tumor of Optic Nerve. *Wiestnik Oftal.*, Nov.-Dec., 1916. *Ann. d'Ocul.*, v. 154, p. 630. 192.
- Ellett, E. C.** Heterochromia Iridis, Heterochromic Cyclitis and Allied Conditions. *Trans. Amer. Opth. Soc.*, 1917, p. 31. *Arch. of Opth.*, v. 46, p. 562. 57.
- Buphthalmos. (Dis.) *Jour. Opth. and Oto-Laryngol.*, v. 11, p. 50. 82.
- Glaucoma, and Lagrange Operation. *Jour. Tenn. State Med. Assn.*, v. 10, p. 263, 460. 85.
- Elliot, R. H.** Some Eccentricities of Indian Ophthalmic Practice. (6 ill.) *Brit. Jour. Opth.*, v. 1, p. 75. 31, 253.

- History of Couching for Cataract. (Bibl.) Tr. Ophth. Soc. United Kingdom, v. 37, p. 264. 92, 101.
- Indian Couching for Cataract. Lancet, March 3, 1917, p. 325, 361. Brit. Jour. Ophth., v. 1, p. 367. 96.
- Ellis, H. A., and Gay, H. M. Treatment of Tuberculous Eyes by Local Application of Tuberculin. Lancet, Aug. 4, 1917, p. 156. Amer. Jour. Ophth., v. 34, p. 283. 7.
- El-Rasheed, A. F. Night Blindness. (Dis.) Ophth. Soc. of Egypt, 1915, p. 16. 118.
- Elsberg, C. A., and Gay, H. M. Hypopituitarism with Homonymous Hemianopsia Relieved by Glandular Treatment. (5 ill.) Arch. of Ophth., v. 46, p. 97. 143.
- Elschnig, A. Disturbance of Adaptation. Klin. M. f. Augenh., July-Aug., 1916. Arch. d'Ophth., v. 35, p. 639. 118.
- Fitness of Myopes for Military Service. Heidelberg Ophth. Cong., 1916. Ann. d'Ocul., v. 154, p. 179. 246.
- Emmert, F. N. Amaurotic Ophthalmoplegia. Penn. Med. Jour., v. 20, p. 709. 30.
- Epstein, J. Amaurotic Family Idiocy. (2 ill.) New York Med. Rec., v. 106, p. 887. 114.
- Erggelet. Polycythemia with Nephritis and Normal Eye-grounds. (Bibl.) Berl. klin. Woch., v. 53, p. 947. 112.
- Espejo. Tabetic Blindness. Abst. Jour. Amer. Med. Assn., v. 70, p. 351. 131.
- Evans, C. A. Unlocalized Intracranial Injuries. Ophthalmology, v. 13, p. 488. 213.
- Evans, J. J. Fundus Lesions in War Nephritis. Tr. Ophth. Soc. United Kingdom, v. 37, p. 238. Brit. Jour. Ophth., v. 1, p. 481. 111.
- Hereditary Optic Atrophy. Birmingham Med. Rev., v. 81, p. 103.
- Ewart, R. J. Influence of Age of Parent at Birth of Child on Eye, etc. Jour. Hyg., v. 16, p. 12. 217.
- Ewing, A. E. Uniform Visual Test Object. (1 ill.) Amer. Jour. Ophth., v. 33, p. 369. 4.
- Postciliary Trephining for Glaucoma. (4 ill.) Amer. Jour. Ophth., v. 34, p. 193. 85.
- Fagin, R. Coloboma of Choroid. Jour. Ophth. and Oto-Laryngol., v. 10, p. 396. 60.
- Removal of Dislocated Lens. (Dis.) Jour. Ophth. and Oto-Laryngol., v. 11, p. 48. 87.
- Melanotic Sarcoma of Choroid. Jour. Ophth. and Oto-Laryngol., v. 10, p. 397. 190.
- Falsh, T. Ocular Tuberculosis Treated with Tuberculin. Ann. of Ophth., v. 26, p. 495. 228.
- Falchi. Peripapillary Combined Cystotomy. Arch. of Ophth., v. 46, p. 135. 98.
- Fava, A. Affections of Lacrimal Apparatus. Ann. d'Ocul., v. 154, p. 378. 163.
- Feilchenfeld. Improved Dark Room. Deut. med. Woch., 1916, No. 42, p. 1388. 1.
- Objective Test for Night Blindness. Berl. klin. Woch., v. 53, p. 1195. Abst. Jour. Amer. Med. Assn., v. 67, p. 2040. 117.
- Optochin Amaurosis. Deut. med. Woch., 1916, No. 11. Amer. Jour. Ophth., v. 34, p. 176. Ophth. Lit., v. 7, p. 60. 123.
- Feingold, M. Late Infection After Elliot Trephining Not Always Fatal. (Bibl.) Southern Med. Jour., v. 11, p. 150. 86.
- Congenital Partial Defect of Retinal Pigment Layer of Iris in Both Eyes. (2 ill.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1916, p. 151. 102.
- Fuchs' Coloboma with Loop of Retinal Vein Hidden Behind Fold of Retina. (Bibl. 1 pl., 1 ill.) Ann. of Ophth., v. 26, p. 153. 102.
- Essential Atrophy of Iris. (1 col. pl.) Amer. Jour. Ophth., v. 1, p. 1. 105.
- Fellows, C. G. Cataracts. Jour. Ophth. Otol. and Laryngol., Nov., 1917, p. 732. 98.
- Fergus, F. Sketch of William Mackenzie. (1 pl.) Brit. Jour. Ophth., v. 1, p. 140. 252.
- Ferguson, J. Optometry in Ontario. Brit. Jour. Ophth., v. 2, p. 435. 251.
- Fernandez Castro, A. Parinaud's Conjunctivitis. Tuberculosis of Conjunctiva. (2 pl.) Bol. de la Soc. Oftal. de Buenos Aires, v. 4, p. 80. Amer. Jour. Ophth., v. 1, p. 608. 41.
- Fernandez, F. M. Ocular Tuberculosis. Rev. Med. y Cirurg., 1918, p. 353. Abst. Jour. Amer. Med. Assn., v. 71, p. 1015. 228.
- Ferree, C. E. Lighting in Relation to Eye. Science, v. 46, p. 220. 236.
- Ferree, C. E., and Rand, G. Some Areas of Color Blindness in Peripheral Retina. Jour. Exp. Psychol., 1917, p. 295. 146.
- Ferro, P. B. Transmission and Diffusing of Conjunctivitis in Argentina, Its Prophylaxis. Bol. de la Soc. Oftal. de Buenos Aires, v. 4, p. 89. 38.
- Psammoma of Sheath of Optic Nerve. Rev. de la Asoc. Med. Argentina, Buenos Aires, v. 26, p. 1040. 192.
- Fiessinger, N., and Leroy, E. Epidemic of Dysentery with Ocular Complications. Ann. d'Ocul., v. 154, p. 188. 224.
- Figueras Pares. Gonorrheal Ophthalmia in Infant, Mother being Free from Blennorrhagia. Arch. de Oftal., Hisp.-Amer., v. 17, p. 83. 32.
- Method of Treating Chronic Dacryocystitis without Extirpation of Lacrimal Sac. Arch. de Oft., Hisp.-Amer., v. 17, p. 12. 162.
- Filatow, V. P. Elliot's Operation. Ann. d'Ocul., v. 154, p. 625. 86.
- Findlay, E. K. Retinitis Proliferans. (Dis.) Chicago Ophth. Soc., Oct., 1916. Ophth. Rec., v. 26, p. 26. 109.
- Finlay, C. E. Paralysis of Superior Oblique from Ethmoiditis. Arch. de Oft., Hisp.-Amer., v. 17, p. 380. 29.
- Finnoff, W. C. Tuberculosis of Retinal Vessels. Colo. Ophth. Soc., Dec., 1916. Ann. of Ophth., v. 26, p. 329. Ophth. Rec., v. 26, p. 153. 108.
- Relation of Mouth to Ocular Diseases. (5 ill.) Ann. of Ophth., v. 26, p. 67, 159. 230.
- See also Crisp, W. H.
- See also Jackson, E.



- Fischer.** Ophthalmology and General Medicine. Ophth. Soc. of Egypt, 1915, p. 11. 234.
- Fischer, V. B.** Haloes of Glaucoma, A Diffraction Phenomena. Ann. of Ophth., v. 26, p. 1. 84.
- Fisher, J. H.** Use and Misuse of Localizing Charts for Plotting Position of Foreign Body. (6 charts.) Ophth. Rev., v. 35, p. 173. 3.
- Intracapsular Extraction of Cataract. Ophth. Rev., v. 35, p. 193. 92, 93, 95.
- Atropin in Cataract Extraction. Brit. Jour. Ophth., v. 2, p. 186. 93.
- Raised Intracranial Pressure in Pregnancy. Brit. Jour. Ophth., v. 1, p. 599. 144.
- Aneurism in Cavernous Sinus. Brit. Jour. Ophth., v. 1, p. 384. 181.
- Fisher, W. A.** Eyes of Kittens in Ophthalmic Operative Teaching. (6 ill.) Ann. of Ophth., v. 26, p. 97. 97.
- Fleischer, B.** Atrophic Myotonia and Cataract. Heidelberg Ophth. Cong., 1916. Ann. d'Ocul., v. 154, p. 175. 90.
- Loss and Preservation of Temporal Field in Shot Wounds. Heidelberg Ophth. Cong., 1916. Arch. of Ophth., v. 46, p. 598. 138.
- Forman, J., and Hugger, C. C.** Melanoblastomas of Eye. (11 ill. Bibl.) Amer. Jour. Ophth., v. 1, p. 97. 187.
- Foroni, C.** Keratectomy. Arch. of Ophth., v. 46, p. 57. 47.
- Foster, M. L.** Diagnosis from Ocular Symptoms. New York: Rebman and Co., 1917. 6.
- Foster, N. B.** Ocular Disease Dependent upon Dental Disease. Jour. Mich. St. Med. Soc., v. 16, p. 406. 61.
- Fox, C. A.** Orbital Cellulitis. Int. Jour. Surg., v. 30, p. 254. 179.
- Franke, E.** Formation of Stump After Removal of Eyeball. Zeit. f. Augenh., v. 35, p. 1. Amer. Jour. Ophth., v. 34, p. 380. 181.
- Franklin, I.** Stereoscopic and Perspective Vision. Amer. Jour. Ophth., v. 1, p. 236. 134.
- Fraxanet, J. V.** Sarcoma of Choroid. (1 ill.) Arch. de Oft., Hisp.-Amer., v. 17, p. 330. 190.
- Fredrick, M. W.** Treatment of Iritis. (Dis.) Calif. State Jour. Med., v. 15, p. 239. 71, 72.
- Frenkel, H.** Retinal Lesions Caused by Injury to Posterior Segment of Eye. Ann. d'Ocul., v. 154, p. 24. Brit. Jour. Ophth., v. 1, p. 504. 106.
- Hemeralopia in Army. Arch. d'Ophth., v. 35, p. 577. 117.
- Traumatic Subluxation of Crystalline Lens. Arch. d'Ophth., v. 35, p. 327. Brit. Jour. Ophth., v. 1, p. 503. Ann. of Ophth., v. 26, p. 628. 197.
- Frias y Onate.** Ocular Disturbance in Disease of Nose. España Oft., Nov., 1917, p. 15. 231.
- Fridenberg, P.** Visual Factors in Equilibration, Especially Aviation. Jour. A. M. A., v. 68, p. 1387; v. 70, p. 991. 135.
- Frieberg, T.** Drainage of Tears and Modern Tear Sac Operation. Zeit. f. Augenh., March, 1917. Brit. Jour. Ophth., v. 2, p. 173. 159.
- Friedenwald, H.** Avulsion of Eyeball. (1 ill.) Amer. Jour. Ophth., v. 1, p. 9. 213.
- Friedländer, W.** Parenteral Injections of Proteins in Eye Affections (Trachoma). Wien. kl. Woch., v. 29, p. 1329. Jour. A. M. A., v. 68, p. 156. 38.
- Fromaget, C., and H.** Latent Nystagmus. Ann. d'Ocul., v. 153, p. 465. 27.
- See Gros, H.
- Frost.** Astigmatia of Crystalline Lens after Iridocyclitis. Vestnik Oftal., v. 32, p. 449. 98.
- Fuchs, E.** Secondary Scleritis and Episcleritis. Heidelberg Ophth. Cong., 1916. Ann. d'Ocul., v. 154, p. 172. Brit. Jour. Ophth., v. 1, p. 769. 53.
- Contraction or Shrinking of Iris. Klin. M. f. Augenh., v. 56, No. 2-3.
- Syphilitic Central Retinitis. Cent. f. p. Augenh., July, Aug., 1916. Ann. of Ophth., v. 26, p. 126. 110.
- The Lamina Cribrosa. Arch. f. Ophth., v. 91, Pt. 3. Brit. Jour. Ophth., v. 2, p. 50. 124.
- Lymphangioma at Place of Cystoid Scar. Klin. M. f. Augenh., v. 56, p. 145. Arch. of Ophth., v. 47, p. 104. 185.
- Fulkerson, C. B.** Roentgenographic Findings of Blind Dental Abscesses Causing Asthenopia. (11 ill.) Amer. Acad. Ophth. and Oto-Laryngol., 1916. p. 196. 20.
- Gage, H.** Myopia. Arch. of Ophth., v. 46, p. 154. 17.
- Galiana.** Quinin Amblyopia. (6 ill.) Arch. de Oft., Hisp.-Amer., v. 17, p. 457. 122.
- Gallenga, C.** Lymphangio-endothelioma of Bulbar Conjunctiva. (14 ill.) Arch. di Ottal., v. 24, pp. 21, 57. 186.
- Galtung, A.** Disease of Optic Nerve from Nasal Disease. Norsk Mag. for Laegevid., 1917, p. 921. Jour. A. M. A., v. 69, p. 1306. 130.
- Garcia del Mazo, J.** Extirpation of Lacrimal Sac in Dacryocystitis. Arch. de Oft., Hisp.-Amer., v. 17, p. 562. 163.
- Garcia Mansilla, D. S.** Cataract Complicated by Hysterical Blindness. Arch. de Oft., Hisp.-Amer., v. 17, p. 509. 90.
- Garraghan, E. F.** Specific Tubercular Keratitis. (Dis.) Chicago Ophth. Soc., Feb., 1917. Ophth. Rec., v. 26, p. 262. 50.
- Complete Detachment of Retina. Ophth. Rec., v. 26, p. 265. 120.
- Gelencser.** Disturbance of Adaptation. Klin. M. f. Augenh., July-Aug., 1916, p. 192. 118.
- Gendron.** Treatment of Ocular Syphilis with Galy. Amer. Jour. Ophth., v. 34, p. 232. 226.
- Genet, L.** Retinal Hemorrhage with Hemoglobinuric Bilious Fever. Ann. d'Ocul., v. 154, p. 375. 108.



- Monocular Blindness Statistics. *Ann. d'Ocul.*, v. 154, p. 377. 216.
- Gennerich, W. Tabetic Optic Atrophy. *Klin. M. f. Augenh.*, April-June, 1916. *Amer. Jour. Ophth.*, v. 34, p. 231. *Ann. of Ophth.*, v. 26, p. 126. 132.
- George, E. J. Theory of Ocular Movements. *Jour. Ophth., Otol. and Laryngol.*, June, 1917, p. 388. 22.
- George, E. J., and Toren, J. A. An Ocular Therapeutic Lamp. (1 ill.) *Ophth. Rec.*, v. 26, p. 235. 8, 47.
- Gibson, C. R. Explanation of Color Vision. *Glasgow Med. Jour.*, v. 89, p. 1. 148.
- Gibson, F. L. Ophthalmic Department at Lemnos. *Brit. Jour. Ophth.*, v. 1, p. 474. 31, 252.
- Gibson, J. L. Use of Giant Magnet. *Med. Jour., Australia*, 1917, p. 553. 211.
- Gifford, H. Occlusion of Inner End of Canaliculus in Trachoma. *Ophth. Rec.*, v. 26, p. 462. 38.
- Habitual Use of Spectacles an Insurance Against Traumatism Rather Than a Risk. *Ophth. Rec.*, v. 26, p. 519. 202.
- Gifford, S. Leucosarcoma of Iris Treated by Radium. (2 ill.) *Arch. of Ophth.*, v. 47, p. 241. 187.
- Gil, R. Acute Catarrhal Pneumococcal Conjunctivitis. *Bol. de la Soc. Oftal. de Buenos Aires*, v. 4, p. 109. 33.
- Ginestous, E. Typhoid Vaccination Does Not Affect Retina. *Paris Méd.*, Feb., 1917. *Jour. A. M. A.*, v. 68, p. 1071. 114.
- Statistics of War Wounds of Eyes. *Progrès Méd.*, v. 32, p. 195. 214.
- Eye Lesions After Typhoid Vaccination. *Prog. Méd.*, v. 32, p. 449. *Jour. Amer. Med. Assn.*, v. 70, p. 578. 222.
- Giuseppe, T. Eye Lesions After Scarlet Fever. *Gaz. degli Ospedali e delle Clin.*, v. 38, p. 803. *Jour. A. M. A.*, v. 69, p. 1038. 222.
- Ocular Lesions in Diphtheria. *Gaz. Degli Ospedali e delle Clin.*, v. 38, p. 921. *Abst. A. M. A.*, v. 69, p. 1478. 222.
- Iron Goggles for War. *Gaz. degli Ospedali e delle Clin.*, v. 38, p. 213. *Jour. A. M. A.*, v. 68, p. 1352. 240.
- Glagoleff, A. V. Corneo-scleral Rupture of Eyeball with Prolapse of Lens. *Vestnik Oftal.*, v. 32, p. 378. 199.
- Gleason, E. B. Obstructive Lacrimonasal Disease. *Sec. on Ophth. Coll. Phys.*, Dec., 1917. *Amer. Jour. Ophth.*, v. 1, p. 354. 161.
- Gloagen. Palpebral Herpes After Antityphoid Vaccination. *Ann. d'Ocul.*, v. 154, p. 48. *Brit. Jour. Ophth.*, v. 1, p. 389. 45, 168.
- Goldbach, L. J. Lymphatic Nodular Keratoconjunctivitis. *Sec. on Ophth.*, *Amer. Med. Assn.*, 1917, p. 286. *Jour. A. M. A.*, v. 69, p. 102. 49.
- Goldberg, H. G. Implantation Cyst of Anterior Chamber. *Trans. Sec. on Ophth.*, *Coll. Phys.*, Phila., 1916, p. 389. 55.
- Goldblum, A. Fragilitas Ossium and Blue Scleras. *Canadian Med. Jour.*, v. 7, 636. 53.
- Goldenburg, M. Intraventricular Injections of Antisyphilitic Serum in Primary Optic Atrophy. *Ann. of Ophth.*, v. 26, p. 433. 132.
- Tower Skull with Double Optic Nerve Atrophy. *Ophth. Rec.*, v. 26, p. 34. *Amer. Jour. Ophth.*, v. 1, p. 760. 141.
- Pathogenesis of Ophthalmia Eczematosa. *Sec. on Ophth.*, *A. M. A.*, 1917, p. 294. *Jour. A. M. A.*, v. 69, p. 104. 230.
- Golovin, S. S. Blindness After Use of Wood Alcohol. *Vestnik Oftal.*, v. 32, p. 453. 124.
- Ligature of Superior Ophthalmic Vein for Pulsating Exophthalmos. *Vestnik Oftal.*, 1917, Nos. 2-5. *Brit. Jour. Ophth.*, v. 2, p. 174. 176.
- Gonne, W. S. Balance Ptosis. *Jour. Mich. State Med. Soc.*, v. 16, p. 286. 165.
- Good, R. H. Double Dacryocystitis. (Dis.) *Jour. Ophth. and Oto-Laryngol.*, v. 11, p. 133. 163.
- Gordon, A. Diagnosis in Lesions of Frontal Lobe with Cerebral Involvement. *Jour. Nerv. and Ment. Dis.*, v. 46, p. 261. 145.
- Visual Hallucinations in Middle Aged Women. *Jour. Nerv. and Ment. Dis.*, v. 47, p. 434. 233.
- Gorriti. Oculocardiac Reflex in Insane. *Semana Med.*, v. 23, p. 671. *Jour. A. M. A.*, v. 68, p. 1073. 234.
- Gowens, H. L. Jr. Present Status of Trachoma. *Hahneman. Mo.*, June, 1917, p. 371. 37.
- Gowland, A. Voluntary Nystagmus. *Bol. de la Oftal. de Buenos Aires*, v. 4, p. 117. *Amer. Jour. Ophth.*, v. 1, p. 369. 27.
- Gradenigo, G. Alternating Monocular Nystagmus. *Gior. d. r. Accad. di Med. di Torino*, v. 22, p. 321. 27.
- Gradle, H. S. Art of Refraction. *Ophthalmology*, v. 13, p. 447. 14.
- Calcareous Deposits in Cornea. *Chicago Ophth. Soc.*, Oct., 1916. *Ophth. Rec.*, v. 26, p. 35. 44.
- Choroiditis of Dental Origin. (2 ill.) *Ann. of Ophth.*, v. 26, p. 419. 61.
- Glaucoma Simplex without Perceptible Rise in Tension. *Arch. of Ophth.*, v. 46, p. 117. 84.
- Computation of Compensation for Ocular Injuries. *Amer. Jour. Ophth.*, v. 1, p. 487. 247.
- Greef, R. Military Eye Protectors of Cellulose and Triple Glass. *Heidelberg Ophth. Cong.*, 1916. *Arch. of Ophth.*, v. 46, p. 592. 239.
- Green, A. S., and Green, L. D. Intracapsular Cataract Operation. (18 ill.) *Sec. on Ophth.*, *A. M. A.*, 1917, p. 313. *Ophthalmology*, v. 13, pp. 406, 579. 95, 98, 99.
- Green, J. Jr. Scleral Trephining in Detachment of Retina. (1 ill.) *Tr. Amer. Acad. Ophth. and Oto-Laryngol.*, 1916, p. 157. *Arch. of Ophth.*, v. 46, p. 104. 118.
- Treatment of Dacryocystitis in Infants. *Jour. Missouri St. Med. Assn.*, v. 14, p. 427. 160.
- Greenwood, A. Eyes of Army and Navy. *Jour. Amer. Med. Assn.*, v. 70, p. 2002. 246.

- Military Ophthalmic Surgery. (Ill.) Medical War Manual, No. 3. Philadelphia: Lea and Febiger, 1917.
- Greeves, R. A. Microscopic Examination of Four Trephined Eyes. *Tr. Ophth. Soc. United Kingdom*, v. 36, p. 445. *Brit. Jour. Ophth.*, v. 1, p. 697. 86.
- Greig, M. Idiopathic Dislocation of Eyeball. (1 ill.) *Edinburg Med. Jour.*, v. 18, p. 129. *Lancet*, March 3, 1917, p. 347. 154, 174.
- Grelault. Infection of Lacrimal Canal in War Ophthalmology. *Le Monde Med.*, v. 27, p. 71. 160.
- Gremaux, P. Ocular Lesions Following Exposures to Gas. *Clin. Opht.*, v. 21, p. 609. 195.
- Griffith, A. H. Spring Catarrh. *Brit. Jour. Ophth.*, v. 1, p. 178. 36.
- Hereditary Retinal Glioma. *Tr. Ophth. Soc. United Kingdom*, v. 37, p. 242. *Brit. Jour. Ophth.*, v. 1, p. 529. *Ophth. Record*, v. 26, p. 358. 191.
- Proptosis and Blindness. *Brit. Jour. Ophth.*, v. 1, p. 178. 192.
- Nonmagnetic Foreign Bodies in Eye. *Brit. Jour. Ophth.*, v. 1, p. 178. 206.
- Grimsdale. Congenital Absence of Choroid. *Arch. of Ophth.*, v. 46, p. 267. 60.
- Congenital Buphthalmos with Enlargement of Retinal Arteries. *Tr. Ophth. Soc. United Kingdom*, v. 37, p. 175. 82.
- Grönholm. Sodium Citrat in Glaucoma. *Finska Läkär. Handl.*, v. 58, p. 1329. *Jour. A. M. A.*, v. 68, p. 320. 84.
- Pre-equatorial Sclerectomy in Detachment of Retina. *Finska Läk.-Sällsk. Handl. Helsingfors*, v. 49, p. 423. 120.
- Gros, H., and Fromaget, H. Choroidal Hemorrhage in Cataract Operation. *Ann. d'Ocul.*, v. 153, p. 476. *Brit. Jour. Ophth.*, v. 1, p. 318. 96.
- Grossman, M. Familial Ophthalmoplegia Interna and Congenital Syphilis. *Jour. Amer. Med. Assn.*, v. 68, p. 963. 29.
- Grosz. Helping War Blind in Hungary. *Heidelberg Ophth. Cong.*, 1916. *Ann. d'Ocul.*, v. 154, p. 181.
- Grünbaum, A. Ocular Fatigue. *Arch. d'Opht.*, v. 35, p. 507. *Amer. Jour. Ophth.*, v. 1, p. 607. 104.
- Guilleuma. Iodides in Cataract. *Brit. Jour. Ophth.*, v. 1, p. 454. 91.
- See also Simon Guilleuma.
- Guix, F. H. Therapeutic Indications of Inflammation of Orbit. *Arch. d'Opht.*, v. 35, p. 445. 180.
- Gunnufsen, P. Operative Treatment of Primary Glaucoma. *Clin. Opht.*, v. 22, p. 293. *Arch. of Ophth.*, v. 47, p. 106. 81, 86.
- Guthrie, D. V. Teaching of Optics. *Science*, v. 46, p. 434. 249.
- Haab, O. Alphabet Keratitis. (Ill.) *Beit-räge z. Augenh.*, June, 1916. *Brit. Jour. Ophth.*, v. 1, p. 375. 44.
- Observations on Cornea and Retina. *Brit. Jour. Ophth.*, v. 1, p. 375. *Ophth. Rec.*, v. 26, pp. 124, 205, 311. 116.
- Hass, H. K. de. Glioma. *Arch. d'Opht.*, v. 35, p. 445. 191.
- Siderosis of Eye. *Arch. d'Opht.*, v. 35, p. 446. 206.
- Hagen, S. Corneo-scleral Cyst After Secondary Glaucoma. (4 ill.) *Norsk. Mag. for Laegevid.*, v. 77, p. 1567. *Jour. A. M. A.*, v. 68, p. 224. *Ann. of Ophth.*, v. 26, p. 304. 50.
- Halipré and Petit. Ocular Paralysis and Exophthalmos from Sinus Thrombosis. *Clin. Opht.*, v. 21, p. 628. 231.
- Hall, A. J. Toxic Ophthalmoplegia (Botulism). *Lancet*, April 20, 1918, pp. 568, 580. 223.
- Hall, E. A. Enucleation of Eyeball. *Canada Lancet*, 1916, p. 299. 155.
- Hallett, DeW. Advantages of Removing Cataract in Capsule. *Jour. Ophth., Otol. and Laryngol.*, Nov., 1917, p. 715. 95.
- Halliday, J. C. Traumatic Severance of Inferior Rectus Oculi; Suture, Recovery. *Med. Jour., Australia*, 1916, p. 119. *Brit. Jour. Ophth.*, v. 1, p. 571. 201.
- Hamilton, R. J. Glaucoma Following Application of Cocain. *Liverpool Med. Chir. Jour.*, v. 36, p. 156. *Clin. Jour.*, v. 46, p. 200. 83.
- Hansell, H. F. Suspected Tumor of Pituitary Body. *Sec. on Ophth., Coll. Phys., Phila.*, April, 191, 1917. *Ophth. Rec.*, v. 26, p. 275. 144.
- Ocular Injuries. *Ann. of Ophth.*, v. 26, p. 374. 196, 199.
- Professor George Stanculeanu—A Tribute. *Ophth. Rec.*, v. 26, p. 646. 253.
- Harbridge, D. F. Intraocular Tumors. *South-west Med. Jour.*, v. 1, p. 33. *Amer. Jour. Ophth.*, v. 1, p. 417. 189.
- Hardy, W. F. Ocular Diseases of Dental Origin. *Amer. Jour. Ophth.*, v. 34, p. 97. 61.
- Hardy, W. F., and Lamb, H. D. Essential Shrinking of Conjunctiva, Two Cases. (Bibl.) *Amer. Jour. Ophth.*, v. 34, p. 289. 42.
- Harford, C. F. Statistics of Defective Vision Obtained at Recruiting Medical Board. *Brit. Med. Jour.*, Aug. 4, 1917, p. 149. 245.
- Harkness, G. F. Exhibition of Clinical Eye Cases. *Iowa St. Med. Soc. Jour.*, v. 7, p. 154. 6.
- Harriet. Posterior Polar Cataract After Injury. *Arch. d'Opht.*, v. 35, p. 374. 197.
- Harris, H. E. Bullet in Sphenoidal Sinus Removed Through Nostril. *Brit. Jour. Ophth.*, v. 1, p. 113. 211.
- Harrison, W. G. Traumatic Intraocular Hemorrhage. *Amer. Jour. Ophth.*, v. 1, p. 132. 101.
- Harrower, D. W. Iridotaxis in Glaucoma. *Tr. Amer. Ophth. Soc.*, 1917, p. 122. *Arch. of Ophth.*, v. 47, p. 37. 85.
- Hartshorne, I. Eye Strain, New York Med. Jour., v. 104, p. 1279. 20.
- Harwood, T. E. Nervous Factors in Relation to Ophthalmic Conditions. *Lancet*, March 24, p. 452; Dec. 16, p. 1014, 1917. 233.



- Hawley, C. W. Glaucoma and Autointoxication. *Pacif. Coast Oto-Ophth. Soc.*, 1917, p. 86. *Ann. of Ophth.*, v. 26, p. 421. 84.
- Head, J. W. Enucleation of Eye Followed by Fat Implantation. *Texas St. Jour. Med.*, v. 12, p. 395. 156.
- Heard, M. K. Eye Strain and Higher Education. *Jour. Iowa St. Med. Soc.*, v. 7, p. 296. 239.
- Heed, C. R. Angioid Streaks in Retina. *Trans. Coll. Phys., Phila., Sec. on Ophth.*, 1916, p. 344. 113.
- A Subretinal Mass. *Trans. Coll. Phys., Phila.*, 1916, p. 250. 190.
- Helfrich, C. H. Efficacy of Mellifica in Cataract. *Jour. Ophth., Otol. and Laryngol.*, Aug., 1917, p. 574. 92.
- Henderson, C. G. Blindness in India. *Med. Press.*, Jan. 9, 1918, p. 23. 241.
- Henschen, S. E. Traumatic Keratitis. *Svenska Läkär. Handl.*, v. 42, p. 971. *Ann. of Ophth.*, v. 26, p. 142. 46.
- Hepburn, M. L. Papilloma of Conjunctiva. (1 col. pl.) *Tr. Ophth. Soc. United Kingdom*, v. 37, p. 190. 186.
- Herbert, H. Prevention of Sepsis in Cataract Operations. *Indian Med. Gaz.*, 1917, p. 18. 92.
- Hernaman-Johnson, F. X-rays in Exophthalmic Goiter. *Practitioner*, July, 1917. *Brit. Jour. Ophth.*, v. 1, p. 715. 177.
- v. Herrenschwand. Congenital Bilateral Optico-ciliary Veins. *Klin. M. f. Augenh.*, v. 56, p. 504. *Arch. of Ophth.*, v. 46, p. 596.
- Ectropion Conjunctivae Palpebrarum. *Klin. M. f. Augenh.*, v. 56, p. 477, 509. *Arch. of Ophth.*, v. 46, p. 595. 172.
- Subretinal Cysticercus. *Wien. klin. Woch.*, v. 29, p. 1332. 235.
- Hertel, E. War Wounds with Intraocular Foreign Bodies. *Heidelberg Ophth. Cong.*, 1916. *Ann. d'Ocul.*, v. 154, p. 165. 206.
- Eye Symptoms in Weil's Disease. *Arch. f. Ophth.*, v. 94, p. 28. 223.
- Herz, L. F. Epithelioma of Nose Caused by Spectacles. *Med. Rec.*, v. 91, p. 370. 185.
- Herz, M. "Sound Writing" for the Blind. *Clin. Ophth.*, v. 22, p. 63. 242.
- Hesse, P. Treatment of Infectious Ophthalmias with Animal Carbon. *Münch. med. Woch.*, 1916, No. 16. *Arch. of Ophth.*, v. 46, p. 592. 11.
- Heuer, G., and Dandy, W. E. Roentgenography in Localization of Brain Tumor. *Bull. Johns Hopkins Hosp.*, v. 27, No. 309. 145.
- Heyl, T. Is After Cataract More Frequent After Operations for Immature Cataract? *Arch. of Ophth.*, v. 46, p. 53. *Brit. Jour. Ophth.*, v. 1, p. 314. 98.
- Higbee, E. H. Intraocular Foreign Bodies. *Amer. Jour. Ophth.*, v. 34, p. 129.
- Higgins, C. Spontaneous Cure of Cataract. *Lancet*, Feb. 23, 1918, p. 296. 87, 91.
- Spectacles of Triplex Glass. *Lancet*, Jan. 1, 1918, p. 85. 240.
- Hill, A. J. Modified Bifocal Lens. (1 ill.) *Jour. Amer. Med. Assn.*, v. 68, p. 911. 21.
- Hill, E. Aniridia. (Dis.) *Ann. of Ophth.*, v. 26, p. 317. 58.
- Surgery of Glaucoma. *Jour. Surg., Gynec. and Obstet.*, v. 23, p. 333. 85.
- Hine, M. L. Recovery of Fields of Vision After Concussion Injuries of Occipital Lobe. (6 ill.) *Brit. Jour. Ophth.*, v. 2, p. 12. 139.
- v. Hippel, E. Optochin Treatment in Pneumonia with Ocular Affection. *Deut. med. Woch.*, v. 42, p. 1089. *Amer. Jour. Ophth.*, v. 34, p. 176. 10.
- Significance of Papillary Areas in Cranial Wounds. *Heidelberg Ophth. Cong.*, 1916. *Arch. of Ophth.*, v. 47, p. 109. 140.
- Tuberculosis, Sympathetic and Proliferating Uveitis of Unknown Etiology. *Graefe's Arch. f. Ophth.*, v. 92, p. 421. *Brit. Jour. Ophth.*, v. 2, p. 442. 227.
- Hird, R. B. Exophthalmos, Causes and Diagnosis. *Brit. Jour. Ophth.*, v. 1, p. 270. 174.
- Tumor in Retina (Massive Exudation). *Tr. Ophth. Soc. United Kingdom*, v. 36, p. 345. *Brit. Jour. Ophth.*, v. 1, p. 696. 190.
- Hirschberg, J. Central Recurrent Retinitis in Syphilis. *Cent. f. p. Augenh.*, March-April, 1916. *Arch. of Ophth.*, v. 47, p. 109. 109.
- History of Cataract Extraction. *Cent. f. p. Augenh.*, v. 40, p. 129. *Ophthalmology*, v. 13, p. 484. 254.
- Hodgson, E. S. Institute of Applied Optics in France. *Science*, v. 45, p. 609.
- Hoeve, van der, J. Action of Naphthalin on Eye. *Arch. d'Opht.*, v. 35, p. 379. 114.
- Abnormal Length of Canaliculi with Ankyloblepharon. *Klin. M. f. Augenh.*, v. 56, p. 232. *Arch. of Ophth.*, v. 46, p. 595. 164.
- Iron Fragment in Eye. *Nederl. Tijdschr. v. Geneesk.*, 1917, p. 1819. *Jour. Amer. Med. Assn.*, v. 70, p. 895. 211.
- Hoeve, van der, J., and Kleijn, A. Blue Sclerotics and Brittle Bones. *Nederl. Tijdschr. v. Geneesk.*, 1917, p. 1003. *Abst. Jour. A. M. A.*, v. 68, p. 1952. 53.
- Hoeve, van der, J., and Mansholt, W. H. Injurious Action of Optochin on Eye. *Nederl. Tijdschr. v. Geneesk.*, 1917, p. 1710. *Jour. A. M. A.*, v. 69, p. 598. 122.
- Hogg, G. H. Diabetic Conjunctivitis. *Med Jour., Australia*, Oct. 28, 1916, p. 387. *Brit. Jour. Ophth.*, v. 1, p. 557. 34.
- Holden, W. A. Eye in Nervous Disease. (3 ill.) *Arch. of Ophth.*, v. 47, p. 221. 231.
- Holloway, T. B. Instrument for Demonstration of Elementary Principles of Refraction. *Sec. on Ophth., Coll. Phys., Phila.*, Feb., 1917.
- Disseminated Choroiditis. *Sec. on Ophth., Coll. Phys., Phila.*, April 20, 1916. *Ann. of Ophth.*, v. 26, p. 365. 67.
- Ring Shaped Opacity in Posterior Portion of Lens. *Ophth. Rec.*, v. 26, p. 524. 88.
- Bilateral Congenital Cataracts. *Ophth. Rec.*, v. 26, p. 524. 88.
- Aviators Dazzling. *Trans. Ophth. Sec., Coll. Phys., Phila.*, 1916, p. 380. 115.



- Snow-ball Opacities of Vitreous. Sec. on Ophth., Coll. Phys.; Phila., April, 1917. 102.
- Pulsation of Retinal Arteries. Ann. of Ophth., v. 26, p. 365. 107.
- Cranial Deformity with Optic Atrophy; Optico-ciliary Vein in Left. Ophth. Rec., v. 26, p. 150. 102, 131.
- Case of Jaw Winking. Trans. Coll. Phys., Phila., Sec. on Ophth., 1916, p. 349. 164.
- Epithelioma of Lids Treated with Radium. Ann. of Ophth., v. 26, p. 366. 184.
- Holmes, G., and Lister, W. T. Cerebral Localization. Brit. Jour. Ophth., v. 2, p. 353. Amer. Jour. Ophth., v. 1, p. 270. 136.
- Holth, S. Spontaneous Cure of Detached Retina. Cent. f. p. Augenh., v. 40, p. 146. Ophthalmology, v. 13, p. 526. 120.
- v. Hoor, K. Trachoma Prophylaxis. Wien. med. Woch., 1916, No. 35. Ophth. Lit. v. 7, p. 60. 37.
- Hoorn, W. Influence of Medicaments on Intracranial Pressure. Arch. d'Ophth., v. 35, p. 506. 80.
- Hoover, F. P. Embolism of Central Artery of Retina. Med. Rec., v. 91, p. 1141. 110.
- Hopkins, G. S. Innervation of Muscle Retractor Oculi. Anat. Rec., Phila.; 1916, p. 199. 21.
- Houghton, H. S. Filarial Parasites in Conjunctival Sac. (9 ill.) Brit. Jour. Ophth., v. 1, p. 543. 235.
- Houstoun, R. A. Theory of Ocular Vision. Science, and Prog., 20th Cent., v. 11, p. 377. 150.
- Howard, H. Multiple Congenital Abnormalities of Eye, One Indicating Origin of Vitreous. (Bibl.) Tr. Amer. Ophth. Soc., 1917, p. 244. 100.
- Howe, L. Relation of Sex to Hereditary Eye Diseases. Tr. Amer. Ophth. Soc., 1917, p. 242. Jour. A. M. A., v. 70, p. 1994. 218.
- Hugger, C. C., and Forman, J. Neuroblastoma of Retina. (4 ill.) Amer. Jour. Ophth., v. 1, p. 234. 191.
- Hughes, H. S. Acute Inflammatory Glaucoma Caused by Holocain. Amer. Jour. Ophth., v. 34, p. 140. 83.
- Cystic Tumor of Hypophysis with Optic Nerve Atrophy. Amer. Jour. Ophth., v. 34, p. 142. 144.
- Hughes, L. J. Monocular Diplopia. Amer. Jour. Ophth., v. 1, p. 201. 135.
- Sarcoma of Choroid. Ann. of Ophth., v. 26, p. 316. 190.
- Detachment of Retina. Ophth. Rec., v. 26, p. 333. 120.
- Hughes, L. W. Lupus of Lids and Cornea. Trans. Coll. Phys., Phila., Sec. on Ophth., 1916, p. 381. 169.
- Hughes, W. F. Management of Cataract. Jour. Indiana State Med. Assn., v. 10, p. 390. 97.
- Hulen, V. H. Early Surgical Treatment of Squint. (2 ill., Dis.) Calif. State Jour. Med., v. 15, p. 243. 25.
- Hupp, F. L. Exostosis of Orbit. Jour. Surg. Gynec. Obstet., v. 24, p. 221. 193.
- Hurst, A. F. Spiral Fields of Vision in Hysteria. (2 ill.) Lancet, Nov., 1917, p. 768. 5.
- Hyde, E. P., and Forsythe, W. E. Visibility of Radiation in Red End of Spectrum. Abst. Bull. Nela Research Lab., Natl. Lamp Works, Cleveland, O. 1917, p. 129. 5.
- Effective Wave-length of Transmission of Red Pyrometer Glasses. Abst. Bull. Nela Research Lab., Cleveland, O., 1917, p. 133. 5.
- Irons, E. E., and Brown, E. V. L. Sinus Disease an Etiologic Factor in Iritis. Ophth. Rec., v. 35, p. 201. 76.
- Irvin, R. B. Classes for Conservation of Vision in City Schools. Ohio State Med. Jour., v. 14, p. 81. 239.
- Ischreyt, G. Rare Retinal Disease. Arch. f. Augenh., v. 81, p. 168. Ophthalmology, v. 13, p. 525. 109, 115.
- Primary Sarcoma of Orbit with Anterior Adhesive Cyclitis in Luxated Eyeball. Klin. M. f. Augenh., v. 46, p. 492. Arch. of Ophth., v. 47, p. 106. 194.
- Ishida. Bell's Phenomenon After Injury. Ophthalmology, v. 13, p. 546. 29.
- Ishihara. Tests for Color Blindness. Amer. Jour. Ophth., v. 1, p. 376. 149.
- Ives, H. E. Lippmann Color Photographs Sources of Monochromatic Light in Photometry. Jour. Optical Soc. Amer., v. 1, p. 49. 148.
- Ives, H. E., and Luckiesh, M. Influence of Temperature on Phosphorescence in Alkaline Earth Sulphides. Abst. Bull. Nela Research Lab., Natl. Lamp Works, Cleveland, O., 1917, p. 177. 6.
- Jackson, E. Slight Remains of Pupillary Membrane. Colo. Ophth. Soc., April, 1917. Ann. of Ophth., v. 26, p. 520. 55.
- Choroidal Tuberculosis and Atrophy. Ophth. Rec., v. 26, p. 468, 518. 68, 75.
- Practical Value and Limitations of the Tonometer. Trans. Amer. Acad. Ophth. and Oto-Laryngology, 1916, p. 123. Ophthalmology, v. 13, p. 437. 3, 81.
- Tests for Visual Acuity. (1 ill.) Ann. of Ophth., v. 26, p. 22. 4.
- Cycloplegia in Measurement of Ametropia. Ann. of Ophth., v. 26, p. 56, 157. 15.
- Paralysis of External Rectus. (Dis.) Ann. of Ophth., v. 26, p. 302. 28.
- Divergent Squint. Ophth. Rec., v. 26, p. 98. 28.
- Conical Cornea or Anterior Myopia. (4 ill.) Sec. on Ophth., A. M. A., 1917, p. 205. Jour. A. M. A., v. 69, p. 793. 52.
- Glaucoma Simplex. Ophth. Rec., v. 26, p. 306. 84.
- Vision After Congenital Cataract. Amer. Jour. Ophth., v. 1, p. 59. 87.
- Prevention of Eye Injuries. Amer. Jour. Ophth., v. 1, p. 284. 239.
- Defects in Education for Ophthalmic Practice. Amer. Jour. Ophth., v. 1, p. 482. 249.

- The Ophthalmic Literature and Ophthalmic Year Book. Amer. Jour. Ophth., v. 1, p. 210. 253.
- Jackson, E., and Finnoff, W. C.** Sarcoma of Choroid. (Dis.) Trans. Amer. Ophth. Soc., v. 15, p. 194. Arch. of Ophth., v. 47, p. 72. 188.
- Jackson, E., and Todd, F. C.** Report of American Board for Ophthalmic Examinations. Sec. on Ophth., A. M. A., 1917, p. 350. 249.
- James, R., and Trevor, R. S.** Hemangioma of Palpebral Conjunctiva Forming Pedunculated Tumors. Brit. Jour. Ophth., v. 2, p. 129. 185.
- Jansson, G.** Bilateral Exophthalmos Caused by Tumor of Orbit. Finska Läk.-Sällsk. Handl., v. 59, p. 965. 192.
- Jean, G. W.** Sarcoma of Conjunctiva. Arch. of Ophth., v. 46, p. 370. 186.
- Jennings, J. E.** Aneurisms of Retinal Arteries. (1 col. pl.) Amer. Jour. Ophth., v. 1, p. 12. 116.
- Jess.** Night Blindness at the Front. Heidelberg Ophth. Congress, 1916. Arch. of Ophth., v. 46, p. 598. 117.
- Jessaman, L. W.** Ocular Defects and Diseases at Massachusetts State Reformatory for Women. Ophth. Rec., v. 26, p. 178. 253.
- Jessop, W. H.** Toxemic Retinitis. Tr. Ophth. Soc. United Kingdom, v. 36, p. 335. 112. Epithelioma of Upper Lid Cured by Radium. Trans. Ophth. Soc. United Kingdom, v. 36, p. 245. 184. Concussion Changes at Yellow Spot Due to Metal Perforating Eyeball. Tr. Ophth. Soc. United Kingdom, v. 36, p. 140. Brit. Jour. Ophth., v. 1, p. 571. 205. Syphilis as Cause of Ocular Disease. Brit. Med. Jour., Nov. 17, p. 706. 224.
- Jickeli, C.** Clearing of Corneal Opacity Produced by Lime. Graefe's Arch. f. Ophth., v. 91, Ht. 3. 51. Acute Inflammatory Exophthalmos. Abst. Arch. of Ophth., v. 47, p. 89. 174. Traumatic Enophthalmos. Klin. M. f. Augenh., v. 56, Ht. 2-3. Arch. of Ophth., v. 47, p. 89. 178.
- Jocqs, R.** Retrobulbar Neuritis. Clin. Ophth., v. 22, p. 257. Amer. Jour. Ophth., v. 1, p. 127. 126.
- Johnson, W. B.** Epithelioma of Cheek and Eyelid. Arch. of Ophth., v. 46, p. 368. 185. Squamous Celled Sarcoma. Arch. of Ophth., v. 46, p. 367. 185.
- Jones, D. F., and Mason, S. L.** Inheritance of Congenital Cataract. Amer. Natur., 1916, p. 751. 88.
- Jones, E. L.** Subconjunctival Injections of Mercury Cyanid. Jour. Tenn. State Med. Soc., v. 9, p. 345. Amer. Jour. Ophth., v. 34, p. 82. 9. Relation of Retinitis Pigmentosa and Allied Conditions to Ductless Glands. Amer. Jour. Ophth., v. 1, p. 107. 113, 229.
- Jones, I. H.** Practical Uses of Recent Work on Internal Ear to Ophthalmologist. Jour. A. M. A., v. 68, p. 829. 22.
- Jones, L. A.** Retinal Sensibility to Hue Differences. Jour. Optical Soc. Amer., v. 1, p. 63. 104.
- Jordan, D. S.** The Color of Letters. Science, v. 46, p. 311. 135.
- Joseph, D. R.** Inhibitory Effect of Adrenalin on Sphincter of Iris. Amer. Jour. Physiol., v. 42, p. 608. 60.
- Juler, F. A.** Rupture of Optic Nerve at Entrance with Laceration of Retinal Vessels. Tr. Ophth. Soc. United Kingdom, v. 36, p. 241. Brit. Jour. Ophth., v. 1, p. 571. 196.
- Junius.** Hemeralopia in War. Zeit. f. Augenh., Oct., 1916, p. 49. 118.
- Kagoshima.** Accommodation in Young Japanese. Nippon Gank Zasshi, July, 1916. Ophthalmology, v. 13, p. 868. 20.
- Kahn, M. H.** Postmortem Ophthalmoscopy. (3 ill.) Berl. klin. Woch., v. 53, p. 1237. 1.
- Kahn, W. W.** Refraction Glasses. Med. Rev. of Rev., v. 23, p. 483. 20.
- Kalt, M.** Orbital Exostosis in Young Subjects. (2 ill.) Ann. d'Ocul., v. 154, p. 723. 193.
- Kanavel, A. B., and Jackson, H.** Eye Grounds in Cyst of Hypophysis. Jour. Surg. Gynecol. and Obstet., v. 26, p. 61. 144.
- Katana.** Elephantiasis of Lid. Nippon Gank Zasshi, June, 1917. 171.
- Katayama.** Epithelioma of Lids. (10 ill.) Nippon Gank Zasshi, Aug., 1916. 184.
- Kearney, J. A.** Desiccation in Eye Surgery. New York Med. Jour., v. 106, p. 789. Amer. Jour. Ophth., v. 34, p. 351. 8. Folliculosis of Conjunctiva. Med. Rec., v. 91, p. 855. 36. Fundus Oculi in Certain Intracranial Conditions. Med. Rec., v. 92, p. 720. 116. Eye Ground Observations in Recent Fracture of Skull. Jour. A. M. A., v. 69, p. 1399. 127. Eye Ground Changes in Cerebro-spinal Paralysis. New York Med. Jour., v. 105, p. 214. Amer. Jour. Ophth., v. 34, p. 221. 128.
- Keiper, G. F.** Detection of Pretended Blindness and Deafness. Jour. Indiana State Med. Assn., v. 10, p. 422. 6.
- Kellogg, F. B.** Exophoria. Pacific Coast Jour. Homeop., v. 28, p. 161. 24.
- Kelsall, H. T.** Removal of Foreign Bodies from Eye. Brit. Jour. Ophth., v. 1, p. 571. 210.
- Kennedy, F.** Ophthalmic Migrain. Jour. Nerv. and Ment. Dis., v. 45, p. 71. 233.
- Kerr, J.** Effect of Contrasted Illumination on Eye. Brit. Jour. Ophth., v. 1, p. 579. Amer. Jour. Ophth., v. 34, p. 127. 237, 238. Glare and the Student's Life. Brit. Jour. Ophth., v. 1, p. 129. 239.
- Key, B. W.** Modification of Barraquer's Operation of Fat Implantation. (Dis.) Arch. of Ophth., v. 46, p. 172. 156. Pulsating Exophthalmos. Arch. of Ophth., v. 47, p. 210. 175. Extensive Penetrating Wound of Globe. Arch. of Ophth., v. 47, p. 204. 202.



- Kiefer, H. A.** Eye, Ear, Nose and Throat Symptoms in Brain Tumor. *Jour. Ophth. and Oto-Laryngol.*, v. 11, p. 175. 146.
- Kimberlin, J. W.** The Cross-eyed Child. *Med. and Surg.*, 1917, p. 109. 25.
- Kinnier-Wilson, S. A.** Ocular Lesions in Epidemic Encephalitis. *Lancet*, July 6, 1918, p. 7. 223.  
See also **Wilson, S. A. K.**
- Kiribuchi.** Treatment of Trachoma. *Graefe's Arch. f. Ophth.*, v. 90, p. 413. *Ophth. Lit.*, v. 7, p. 84. *Ophthalmology*, v. 12, p. 576. 38.
- Kirk, J.** Eye Changes in Trench Nephritis. *Brit. Med. Jour.*, Jan. 5, 1918, p. 7. 112.
- Kirkpatrick, H.** Sclero-corneal Trephining in Madras. *Govt. Ophth. Hosp. Rep.*, 1916, p. 11. 86.  
Goggles After Cataract Extraction. *Rep. Govt. Ophth. Hosp. Madras*, 1916, p. 11. *Ophth. Lit.*, v. 7, p. 108. 98, 240.  
Cataract Operations in Madras. *Rep. Govt. Ophth. Hosp. Madras*, 1916, p. 9. 98, 99.  
Retinitis Pigmentosa, Trephining. *Rep. Govt. Ophth. Hosp.*, 1916, p. 12. 113.  
Etiology of Optic Atrophy. *Rep. Govt. Ophth. Hosp. Madras*, 1916, p. 12. 131.  
Disease of Lacrimal Sac; Excision. *Rep. Govt. Ophth. Hosp. Madras*, 1916, p. 13. 163.  
Double Orbital Sarcoma. (3 ill.) *Brit. Jour. Ophth.*, v. 1, p. 364. 194.  
Symmetric Sarcoma of Orbit. *Rep. Govt. Ophth. Hosp. Madras*, 1916, p. 14. 194.
- Kitamura.** Ocular Syphilis with Disturbance of Lower Lid. *Nippon Gank. Zasshi*, July, 1916. *Ophthalmology*, v. 13, p. 686. 169.
- Kleinhans, P. H.** Synchronous Movements of Lids and Jaw. *Wills Hosp. Ophth. Soc.*, Dec., 1916. *Ann. of Ophth.*, v. 26, p. 213. 164.
- de Kleijn, A.** Nasal Treatment of Affections of Frontal Sinuses. *Arch. d'Opht.*, v. 35, p. 444. 180.
- Klinedinst, J. F.** Herpes Zoster Ophthalmicus. (Dis.) *Penn. Med. Jour.*, v. 21, p. 752. 232.
- Knapp, A.** Present Status of Operation for Extraction of Cataract in Capsule. *Arch. of Ophth.*, v. 46, p. 27. 94.  
Ocular Symptoms in Tumor of Frontal Lobe. *Trans. Amer. Ophth. Soc.*, v. 15, p. 85. *Arch. of Ophth.*, v. 47, p. 83. 145.  
Surgical Treatment of Corneal Suppuration in Exophthalmic Goiter. *Arch. of Ophth.*, v. 47, p. 173. 177.  
Fracture of Frontal Bone Involving Orbit. *Arch. of Ophth.*, v. 46, p. 272. 181.  
Bilateral Glioma. *Arch. of Ophth.*, v. 46, p. 272. 191.  
The Herman Knapp Memorial Eye Hospital. *Modern Hosp.*, Sept., 1918, p. 153. 252.
- Knorr, E. A.** One Hundred Consecutive Cataract Operations. *Jour. Ophth. and Oto-Laryngol.*, v. 11, p. 207. 99.
- Köllner.** Epithelial Formation at Corneal Limbus, Recurring After Five Years, Cured with Mesothorium. *Arch. of Ophth.*, v. 46, p. 130. 186.
- Köppe.** Nernst Lamp and Corneal Microscope. *Graefe's Arch. f. Ophth.*, v. 91, Pt. 3. *Amer. Jour. Ophth.*, v. 34, p. 174. 2.  
Therapeutic Effects in Tuberculous Iritis with Nernst Lamp. *Graefe's Arch.*, v. 92, p. 115. 67, 72.  
The Nernst Lamp and Corneal Microscope. *Graefe's Arch. f. Ophth.*, v. 92, p. 115. *Amer. Jour. Ophth.*, v. 34, p. 174. 82.  
Influence of Iris Pigment in Glaucoma. *Heidelberg Ophth. Cong.*, 1916. *Arch. of Ophth.*, v. 47, p. 106. 82.
- Kollock, C. W.** Three Hundred Cataract Operations. *Jour. So. Carolina Med. Assn.*, v. 13, p. 544. 98.  
Eye of Pregnant Woman. *Jour. Ophth. and Oto-Laryngol.*, v. 11, p. 105. 111.  
Interesting Conditions Seen in Eye of Negro. *Southern Med. Jour.*, v. 10, p. 344. *Amer. Jour. Ophth.*, v. 34, p. 226. 220.
- Komoto.** Blepharoplasty by Italian Method. *Nippon Gank. Zasshi*, July, 1916. *Ophthalmology*, v. 13, p. 870.  
Primary Uveal Tract Sarcoma (100 Cases). *Nippon Gank. Zasshi*, Jan., March, May, Sept. and Nov., 1916. 188.
- Komoto and Hari.** Traumatic Enophthalmos. Krönlein Operation. *Nippon Gank. Zasshi*, Sept., 1916. 178.
- Koroleff.** May Life on Fleet Influence Development of Cataract? *Norsk. Vrach*, Petrograd, 1915, p. 97. 98.
- Kosima.** Bilateral Endothelioma of Eyelids. (3 ill.) *Nippon Gank. Zasshi*, Sept., 1916. *Ophthalmology*, v. 13, p. 869. 185.  
Congenital Lymphoma Caused by Foreign Body in Conjunctival Sac. *Nippon Gank. Zasshi*, July, 1916. 185.
- Koster, W.** Presbyopic Asthenopia. *Arch. d'Opht.*, v. 35, p. 446. 20.  
Abnormal Voluntary Ocular Movement. *Arch. d'Opht.*, v. 35, p. 445. 23.  
Spontaneous Resorption of Cataract in Old Man. *Arch. d'Opht.*, v. 35, p. 444. 91.  
Removal of Small Foreign Body from Anterior Chamber. *Nederl. Tijdschr.*, v. Geneesk, 1917, p. 802. 208.
- Koyanagi.** Pathology of Secondary Glaucoma with Luxation of Lens. *Nippon Gank. Zasshi*, Jan., 1916. 84.  
Leukemic New Formation in Retina. (2 ill., Bibl.) *Amer. Jour. Ophth.*, v. 34, p. 203. 106.  
Blood Cyst of Orbit. (1 ill., Bibl.) *Nippon Gank. Zasshi*, March, 1916. 178.
- Krähenbuhl.** Ocular Lesions in Myasthenia Gravis. *Corresp.-Bl. f. Schweiz. Aerzte*, Nov. 25, 1916. *Arch. of Ophth.*, v. 46, p. 584. 232.
- Kraupa-Runk-Teplitz.** Embolism of Central Retinal Artery. *Münch. med. Woch.*, 1916. No. 25. 111.
- Krauss, F.** Thrombosis of Superior Branch of Retinal Vein. *Sec. on Ophth.*, Coll. Phys., Phila., Feb., 1917. 110.



- Bilateral Choked Disc Following Thyroid-ectomy. *New York Med. Jour.*, v. 106, p. 552. *Ann. of Ophth.*, v. 26, pp. 363, 382. 129.
- Ligation of Ophthalmic Vein for Exophthalmos. (2 ill.) *Ophthalmology*, v. 13, p. 215. 175.
- Discoloration of Posterior Capsule of Lens After Injury. Resulting in Excellent Vision. *Ophth. Rec.*, v. 26, p. 637. 201.
- Krebs, A. Melanotic Sarcoma. *Penn. Med. Jour.*, v. 21, p. 121. 194.
- Krivososoff, S. Echinococcus of Orbit. *Vestnik Oftal.*, Jan., 1915. *Ann. d'Ocul.*, v. 154, p. 624. 180.
- Krückmann. Lymphatic Ducts of Retina. *Heidelberg Ophth. Cong.*, 1916. *Arch. of Ophth.*, v. 46, p. 595. 102.
- Ocular Injuries of War and the Antrum of Highmore. *Wien. med. Klin.*, 1916, p. 1618. *Ann. d'Ocul.*, v. 155, p. 115. 199.
- The War Blind. (Dis.) *Wien. med. Klin.*, No. 44, p. 1654. 244.
- Ocular Standards for Military Service. *Heidelberg Ophth. Cong.*, 1916. *Arch. of Ophth.*, v. 46, p. 584.
- Krusius, F. Suture of Eyeball in Fresh Injury of Eye. *Deut. med. Woch.*, v. 42, p. 1469. *Arch. of Ophth.*, v. 46, p. 593. 202, 217.
- Kuhfeldt, E. Subchronic Febrile Uveo-Parotid Inflammation. *Brit. Jour. Ophth.*, v. 1, p. 621. 69.
- Kuhnt, H. Plastic Operations in Ocular War Injuries. *Heidelberg Ophth. Cong.*, 1916. *Arch. of Ophth.*, v. 46, p. 606. 216.
- Kumagai, N. Changes in Intraocular Tension and Albumin of Aqueous by Drugs. (2 ill.) *Nippon Gank. Zasshi*, Aug., 1916. 103.
- Kümmell, R. Atrophying Conjunctivitis with Symblepharon. *Arch. of Ophth.*, v. 46, p. 147. 42.
- Ocular Changes in Leukemia. *Graefe's Arch. f. Ophth.*, v. 95, p. 105. 229.
- Kuriyama. Chronic Marginal Grooved Keratitis. (Ill.) *Nippon Gank. Zasshi*, July, 1916. 44.
- Kurkoff, T. F. Epibulbar Melanosarcoma of Eye. *Sibirsk Vrach*, 1915, p. 330. 186.
- Kusama and Nakayama. Panophthalmitis from Pseudodiphtheritic Bacilli. *Nippon Gank. Zasshi*, July, 1916. *Ophthalmology*, v. 13, p. 869. 154.
- Kusama, K. Pathologic Anatomy of Arcus Juvenilis of Cornea. *Mittel. med. Facultät d. kaiser. Univ.*, Tokyo, 1917, p. 159. *Ophthalmology*, v. 13, p. 874. 50.
- Pathologic Anatomy of Fatty Degeneration of Cornea. (1 pl.) *Nippon Gank. Zasshi*, Oct., 1916. *Ophthalmology*, v. 13, p. 874. 50.
- Adrenalin in Blood of Patients Suffering from Primary Glaucoma. *Mitt. med. Facultät d. kaiser. Univ.*, Tokyo, 1917, p. 137. 84.
- Kyle, J. J. Dacryocystorhinostomy. *Med. Times*, v. 55, p. 46. 163.
- Eye in War Time. *Med. Council*, v. 23, p. 299. 246.
- Lacroix, A. The Ambulant Ophthalmologic Service. *Arch. d'Ophth.*, v. 35, p. 482. *Brit. Jour. Ophth.*, v. 1, p. 762. 252.
- Lagrange, F. Disorders of Visual Apparatus from Injury to Orbit. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 289. 196.
- Lamb, F. W. Conjunctivitis Tularensis (Squirrel Plague). (1 pl.) *Amer. Acad. Ophth. and Oto-Laryngol.*, 1916, p. 135. *Ophth. Rec.*, v. 26, p. 221. 33.
- Lamb, H. D. Magnet Extraction of Foreign Body from Vitreous Chamber. *Amer. Jour. Ophth.*, v. 34, p. 134. 211.
- Five Papillomatous Ocular Growths. (1 ill.) *Amer. Jour. Ophth.*, v. 34, p. 354. 186.
- See also Hardy, W. F.
- Lamb, R. S. Subconjunctival Injections of Salvarsanized Serum in Ocular Syphilis. *Amer. Jour. Syphilis*, 1917, p. 58. *Amer. Jour. Ophth.*, v. 34, p. 255. 10.
- Fibrolysin in Treatment of Ocular Disease. *Arch. of Ophth.*, v. 46, p. 233. 11.
- Neuroma Embryonale of Left Lateral Ventricle of Brain with Double Choked Disc. *Amer. Ophth. Soc.*, 1917, p. 212. 146.
- Internal Secretory System and the Eye. *Tr. Amer. Acad. Ophth. and Oto-Laryngol.*, 1916. *Ophthalmology*, v. 13, p. 434. 229.
- Landolt, M. False Muscular Projection of Eye Nonparalytic. *Arch. d'Ophth.*, v. 35, p. 503. 23.
- Night Blindness in Soldiers. *Arch. d'Ophth.*, v. 35, p. 580. 117.
- Heredity and Somatic Changes. *Arch. d'Ophth.*, v. 36, p. 35. 220.
- Syndrome with Total Color Blindness. *Annales de Med.*, 1916, p. 498. 149.
- Lane, L. A. Primary Progressive Atrophy of Iris. (1 ill., Bibl.) *Ophth. Rec.*, v. 26, p. 285. 73.
- Lang, W. Causes of Iritis. *Roy. Soc. Med. Sec. on Ophth.*, June 3d, 1917. *Lancet*, June 23, 1917, p. 956. 61, 62, 66, 67, 72.
- Langdon, H. M. Nodular Iritis Accompanying Polyarthritides of Undetermined Origin. *Trans. Coll. Phys. Phila.*, Sec. on Ophth., 1916, p. 356. 65.
- Langworthy, H. G. Relations of Cavernous Sinus to Other Structures. *Ann. of Otol., Rhin. and Laryngol.*, v. 25, p. 554. 231.
- Lanier, L. H. Plastic Surgery of Nose and Eyelids. *Jour. Arkansas Med. Soc.*, v. 13, p. 155. 173.
- Lansdale, P. S. Tuberculosis of Retinal Vessels. *Ophth. Rec.*, v. 26, p. 309. 109.
- Lapersonne, F. de. Antityphoid Vaccination and Ocular Lesions. *Arch. d'Ophth.*, v. 35, p. 449. *Amer. Ophth. Soc.*, v. 1, p. 160. 222.
- Ophthalmology in the Army. *Arch. d'Ophth.*, v. 35, p. 452. *Brit. Jour. Ophth.*, v. 1, p. 503. 155.
- Ophthalmic Organization in Army. *Arch. d'Ophth.*, v. 35, p. 452. 248.

- Larsen, H. Operation for Convergent Strabismus. *Hosp. Tid.*, 1916, 193. 25.
- Lauber, H., and Henning, K. Ocular Prothesis. *Clin. Ophth.*, v. 22, p. 298. 183.
- Lauboy, C., and Harvier, P. Oculocardiac Reflex. *Arch. des Mal. du Coeur.*, v. 10, p. 209. *Jour. A. M. A.*, v. 69, p. 496. 234.
- Lavagna, L. Late Ocular Complications in Cerebrospinal Meningitis. (3 ill.) *Clin. Ophth.*, v. 22, p. 595. 223.
- Lavergne, M. Meningococcus Irido-choroiditis. *Arch. Méd. des Enfants*, v. 20, p. 189. 69, 73.
- Lawford, J. B. Treatment of Syphilitic Eye Affections. *Tr. Ophth. Soc. United Kingdom*, v. 36, p. 10. *Brit. Jour. Ophth.*, v. 1, p. 456. 225.
- Lawrence, G. A. Bilateral Metastatic Panophthalmitis after Pneumonia. *Penn. Med. Jour.*, v. 20, p. 749. 154.
- Lawson, A. Fur Infection of Conjunctiva from Cats. *Sec. on Ophth., Roy. Soc. Med.*, Feb., 1917. *Brit. Jour. Ophth.*, v. 1, p. 310. 33.
- Blinded Soldiers and Sailors at St. Dunstan's. *Lancet*, Feb. 10, 1917, p. 223. *Brit. Jour. Ophth.*, v. 1, p. 137. *Lancet*, Oct. 27, 1917, pp. 354, 694. 244.
- Lawson, A., and Collins, E. T. Detachment of Retina at Ora Serrata. *Tr. Ophth. Soc. United Kingdom*, v. 37, p. 231. *Brit. Jour. Ophth.*, v. 1, p. 602. 120.
- Leal. Glioma. *Tribuna Méd.*, v. 22, p. 235. 191.
- Leavitt, M. J. Recurrent Paralysis of Right Abducens Lasting 21 years. *Ophth. Rec.*, v. 26, p. 460. 28.
- Acute Glaucoma After One Drop of One Percent Homatropin. *New York Med. Jour.*, v. 106, p. 362. 83.
- Legge, T. M. Glassworkers' Cataract. Kober and Hanson's "Diseases of Occupation," p. 331. 89.
- Lehrfeld, L. Serum Therapy as Applied to Pneumococcal Infections of Eye. *New York Med. Jour.*, v. 106, p. 214. *Amer. Jour. Ophth.*, v. 34, p. 319. 7.
- Leiper, R. T. Thelaziasis in Man. *Brit. Jour. Ophth.*, v. 1, p. 546. 236.
- Lemere, H. B. Ocular Lesions in Intracranial Growths. *Nebraska State Med. Jour.*, v. 3, p. 59. 146.
- Lenoir. Acute Infectious Retrobulbar Optic Neuritis. (Bibl.) *Ann. d'Ocul.*, v. 154, p. 411. 126.
- Lentz, G. Localization of Central Vision. Graefe's *Arch. f. Ophth.*, v. 91, p. 264. *Ophth. Lit.*, v. 7, p. 34. 134.
- Leonard, E. F. Amaurotic Family Idiocy. *Ill. Med. Jour.*, v. 31, p. 327. 114.
- Leoz, G. Ocular Sporotrichosis. *Arch. de Oft. Hispano-Amer.*, v. 17, p. 293. *Ann. of Ophth.*, v. 26, p. 640. 226.
- Lead Amblyopia. (2 ill.) *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 442. 124.
- Leoz Ortin, Experimental Keratoplasty. (7 ill.) *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 615. 51.
- Foreign Body in Orbit Retained Eight Months. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 25. 208.
- Leplat, G. Ocular Troubles from Distant Explosives. *Arch. Méd. Belges*, v. 70, p. 385. *Brit. Jour. Ophth.*, v. 1, p. 763. 196.
- Levison, C. G. Certain Types of Toxic Exophthalmic Goiter. *Amer. Jour. Surg.*, v. 31, p. 234. 177.
- Levitskaya, O. P. Lymphoma of Culdesac of Upper Lid Penetrating Orbit. *Vestnik Oft.*, v. 32, p. 415. 184.
- Fibroma of Orbit. *Ann. d'Ocul.*, v. 154, p. 629. 186.
- Levy, A. H. Optic Atrophy in Child. (1 pl.) *Tr. Ophth. Soc. United Kingdom*, v. 36, p. 319. 131.
- Levy, J. M., and Steinbugler, W. P. C., and Pease, M. C. Metastatic Eye Affections from Dental Foci. *Jour. Amer. Med. Assn.*, v. 69, p. 194. 61, 63, 71.
- Lewin, P. Acrocephaly, Tower Skull. *Amer. Jour. Dis. Child.*, v. 13, p. 61. 141.
- Lewis, A. C. Retino-choroiditis. *Jour. Tenn. Med. Assn.*, v. 9, p. 459. 116.
- Lewis, F. P. Crystalline Deposits in the Eye. *Sec. on Ophth. A. M. A.*, 1917, p. 119. *Jour. A. M. A.*, v. 69, p. 12. 218.
- Linnell, E. H. Chronic Eye Strain Cured by Training Fusion Faculty. *Jour. Ophth. Otol. and Laryngol.*, Jan., 1917, p. 45. 27.
- Lippincott, J. A. Binocular Metamorphopsia Produced by Optical Means. (12 ill.) *Arch. of Ophth.*, v. 46, p. 397. 133.
- Lischkoff, M. A. Simulated Blindness. *Florida Med. Assn. Jour.*, 1917, p. 204. 6.
- Litchy, J. A. Migrain. *Ophth. Rec.*, v. 26, p. 192. 233.
- Lloyd, R. I. Hemianopsia. (19 ill.) *Ophth. Rec.*, v. 26, p. 491. 141.
- Perimetry and Campimetry. *Jour. Amer. Inst. Homeop.*, v. 10, p. 1284. 141.
- Stereoscopic Campimeter Slate. (3 ill.) *Ophth. Rec.*, v. 26, p. 391. 5.
- Lobanoff, S. V. Lack of Correspondence between Acuity of Vision and Objective Changes in Eye. *Sibirsk Vrach.*, 1916, p. 285. 4.
- Sodium and Potassium Iodid in Cataract. *Sibirsk Vrach.*, 1915, p. 91. 92.
- Lo Cascio. Retinal Lesions in Diabetes Mellitus. *Ann. di Ottal. e Clin. Occul.*, v. 1, p. 310. 112.
- Constituents of Ocular Pigment. *Ann. di Ottal. e Clin. Occul.*, v. 1, p. 505. 219.
- Loeb, C. Amblyopia ex Anopsia Aggravated by Hysteria. *Ill. Med. Jour.*, May, 1918, p. 261.
- Institution for Education of Blinded Soldiers. *Amer. Jour. Ophth.*, v. 1, p. 374. 244.
- Annals of Ophthalmology. *Amer. Jour. Ophth.*, v. 1, p. 148. 253.
- What the Oculist can Learn from Other Physicians. *Ill. Med. Jour.*, v. 33, p. 313.
- Löhlein, W. Night Blindness on the Field. *Arch. d'Ophth.*, v. 35, p. 639. *Ophth. Lit.*, v. 7, p. 35. 118.



- Lohmann, W.** Blind Spot in Relation to Space Value of Retina. *Arch. f. Augenh.*, v. 81, p. 183. *Ophthalmology*, v. 13, p. 536. 142.
- Lopez, J. P.** Dilatation of Pupil with Nasal Obstruction. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 50. 56.
- Lorant.** Persistent Optochin Amaurosis. *Deut. med. Woch.*, v. 42, p. 1355. *Amer. Jour. Ophth.*, v. 34, p. 178. *Ann. of Ophth.*, v. 26, p. 125. 122.
- Lorenz, C. F.** Spot Testing of Incandescent Filaments. *Abst. Bull. Nela Research Nat'l Lamp Works, Cleveland, O.*, 1917, p. 213. 6.
- Lowell, H.** Tendon Muscle Lengthening with Special Forceps. (1 ill. Bibl.) *Arch. of Ophth.*, v. 46, p. 224. 23.
- Löwenstein, A.** Ocular Wounds in the Mountains. *Heidelberg Ophth. Cong.*, 1916. *Arch. of Ophth.*, v. 47, p. 112. 200.
- Löwenstein, A., and Neuhaus, E. R.** Cranial Shots and Optic Nerve. *Med. Klin.*, 1916, No. 16. *Ophthalmology*, v. 13, p. 486. 213.
- Lucanus, H.** Method of Examining Anterior Segment of Eyeball. *Arch. f. Augenh.*, v. 81, p. 197. *Ophthalmology*, v. 13, p. 492. 1.
- Luckiesh, M.** Visual Acuity in White Light. *Abst. Bull. Nela Research. Nat'l Lamp Works, Cleveland*, 1917. p. 255. 3.
- Growth and Decay of Color Sensations in Flicker Photometry.** *Ibid.*, p. 197. 6, 104.
- Investigation of Diffusing Glassware.** *Ibid.*, p. 218. 6, 237.
- Glasses for Protecting Eyes in Industrial Processes.** *Ibid.*, p. 299. 240.
- Color in Lighting.** *Ibid.*, p. 223. 240.
- Purkinje Effect, Comparison of Flicker.** *Ibid.*, p. 194. 104.
- Influence of Color Surroundings on Color of Light.** *Ibid.*, p. 235.
- Radiant Energy and Eye.** *Ibid.*, p. 282. 114.
- Natural and Artificial Light Distribution in Interiors.** *Ibid.*, p. 239. 240.
- Lundsgaard, K.** Warning Against Observation of Eclipse of Sun with Unprotected Eyes. *Cent. f. p. Augenh.*, v. 50, p. 147. *Ophthalmology*, v. 13, p. 486. 114.
- Lutz, A.** Unilateral Vertical Nystagmus of Adolescence. *Arch. of Ophth.*, v. 46, p. 356. 27.
- Congenital Enophthalmos with Complete Absence of Abduction and Retraction of Eyeball in Adduction.** (6 pl.) *Arch. of Ophth.*, v. 46, p. 243. 178.
- Light Pupillary Reflex with Unilateral Argyll-Robertson Pupil, Consensual Reaction in Both Eyes.** *Arch. of Ophth.*, v. 47, p. 266. 164.
- McBean, G. M.** Serous Tenonitis and Orbital Cellulitis. *Jour. Ophth. and Otol. and Laryngol.*, Nov., 1917, p. 201. 178.
- McCallan, A. F.** Glaucoma in Egypt. *Bull. Ophth. Soc. of Egypt*, 1915, p. 73. 85.
- Statistics of Blindness in Egypt During 1914.** *Ophth. Soc. of Egypt*, 1915, pp. 13, 15, 36, 87. 252.
- McCaw, H. J., Perdrau, J. R., and Stebbing, G. F.** Toxic Bulbar Paralysis (Botulism) *Lancet*, April 27, 1918, p. 616. 223.
- McCaw, J. A.** Luetic Neuroretinitis. *Ophth. Rec.*, v. 26, p. 104. 108, 128.
- McCool, J. L.** Focal Infections and their Relation to Disease of Eye. *Pacific Coast Oto-Ophthalmic Soc.*, 1917, p. 50. 61.
- McDannald, C. E.** Vernal Catarrh Treated with Radium. *Arch. of Ophth.*, v. 46, p. 278. 36.
- Trachoma Treated with High Frequency Current.** *Arch. of Ophth.*, v. 46, p. 278. 36.
- McDonagh.** Salvarsan and Chemotherapy in Ocular Therapeutics. *Clin. Opht.*, v. 22, p. 197. *Ann. of Ophth.*, v. 26, p. 633. 11.
- McDonald, C. A.** Exophthalmic Goiter. *Rhode Island Med. Jour.*, Nov., 1917, p. 227. 176.
- McGuire, H. H.** Sarcoma of Choroid and Ciliary Body. *Ophthalmology*, v. 13, p. 454. 189.
- Conservation of Vision.** *Va. Med. Semi-Mo.*, v. 22, p. 219. 241.
- McGurn, W. J.** Ocular Symptoms in Multiple Sclerosis Due to Inhalation of Carbon Monoxid Gas. *Med. Rec.*, v. 91, p. 149. 232.
- McHenry, D. D.** Treatment of Keratitis. *Jour. Okla. State Med. Assn.*, v. 10, p. 46. 46.
- McHenry, J. H.** Amaurotic Family Idiocy (4 ill.) *Arch. of Pediat.*, v. 34, p. 161. 114
- Decompression Craniotomy in Bulle! Wound of Brain Destroying Eye.** (1 ill.) *Jour. A. M. A.*, v. 68, p. 544. 213.
- MacKenzie, G. W.** Eye Examination as Aid to General Diagnosis. *Jour. Ophth. Otol. and Laryngol.*, Sept., 1917, p. 588. 6.
- After Turning Nystagmus.** *Ann. of Otol. Rhin. and Laryngol.*, v. 26, p. 445. 30.
- Occlusion of Superior Branches of Central Artery. Due to Thrombosis of Central Vein of Retina.** (2 ill. 2 col. pl.) *Amer. Acad. Ophth. and Oto-Laryngol.*, 1916, p. 39. 110.
- Ocular Complications in Large Subdural Cyst of Frontal Lobe.** *Jour. Ophth.*, *Otol. and Laryngol.*, Sept., 1917, p. 627. 128.
- McKeown, E. E.** Disease of Optic Nerve and Retina Due to Accessory Sinus Disease. *Colo. Ophth. Soc.*, Dec., 1916. *Ann. of Ophth.*, v. 26, p. 335. 350. 130.
- Steel in Vitreous.** *Ann. of Ophth.*, v. 26, p. 336. 338. 202.
- Severe Eye Injury.** *Ophth. Rec.*, v. 26, p. 250. 206.
- McMannus, T. U.** Conservation of Vision. *Jour. Iowa State Med. Assn.*, v. 7, p. 51.
- McMullen, J.** Trachoma. What the Government is Doing to Prevent its Spread. *Jour. Ophth. and Oto-Laryngol.*, v. 11, p. 35. 37.
- Trachoma in the Army.** *U. S. Public Health Service*, July 13, 1917. 37.



- McMullen, M. H.** Injuries of Eye, Siderosis Bulbi. Ophth. Soc. United Kingdom, v. 36, p. 138. 206.  
Development of the Ophthalmoscope. Tr. Ophth. Soc. United Kingdom, v. 37, p. 325. Brit. Jour. Ophth., v. 1, p. 593. 253.
- Macht, D. I.** Absorption of Apomorphin through Conjunctiva. Jour. A. M. A., v. 68, p. 1230. 9.
- Machwitz, H., and Rosenberg, M.** Nephritis with Albuminuric Neuro-retinitis. Münch. med. Woch., v. 43, p. 1543. Jour. A. M. A., v. 68, p. 156. 112.
- Mack, C.** Hole in Macula. Arch. of Ophth., v. 47, p. 206. 115.
- Mackay, G.** Uveo-parotitis with Iridocycloplegia. Brit. Jour. Ophth., v. 1, p. 612. 70.
- Maddox, E. E.** Local Anesthetics. Ophth. Rec., v. 26, p. 145. 12.  
Clinical Note on Advancement. Brit. Jour. Ophth., v. 1, p. 178. 25.  
Operation for Ptoxis. (2 ill.) Brit. Jour. Ophth., v. 1, p. 358. 166.
- Maggiore, L.** Episcleral Larva (Ophthalmomyiasis). (2 ill.). Ann. di Ottal. e Clin., 40, p. 107. Brit. Jour. Ophth., v. 1, p. 563. Ophth. Lit., v. 7, p. 107. 33, 234.  
Cure of Keratoconus. Ann. di Ottal. e Clin. Ocul., v. 40, p. 113. 52.  
Canal of Schlemm in Human Eye, Its Normal and Pathologic Conditions. (64 ill.) Ann. di Ottal. e Clin. Ocul., v. 40, p. 317. 79.  
Synopsis (Association of Color with Sound). Ann. di Ottal. e Clin. Ocul., v. 40, p. 223. 135.
- Magitot, A.** Origin of Aqueous Humor. Ann. d'Ocul., v. 154, pp. 65, 129, 211. 54.  
Physiologic Ocular Tension. Ann d'Ocul., v. 154, pp. 272, 334, 385. 79.  
Movable Artificial Stump for Artificial Eye in Enucleation. Bull. de l'Acad., v. 77, p. 177. Amer. Jour. Ophth., v. 34, p. 150. 156.
- Majewski, K.** Simulation. (Dis.) Wien. med. Woch., No. 38, 1916, p. 1466. 6.
- Malling, B.** Color Sense. Norsk Mag. for Laegevid., v. 79, p. 1. Amer. Jour. Ophth., v. 1, p. 362. 148.
- Mann, R. H. T.** Iridocyclitis. Southwest Jour. Med and Surg., v. 15, p. 55. 73.
- Mann, W. A.** Aniridia. Ophth. Rec., v. 26, p. 261. 58, 73.
- Mansilla, G.** Sarcoma of Right Optic Nerve. Arch. de Oft. Hisp.-Amer., v. 18, p. 134. 192.
- Marbourg, E. M.** Dislocation of Lens. Amer. Jour. Ophth., v. 1, p. 61. 87.  
Melanosarcoma at Limbus. Ann. of Ophth., v. 26, p. 358. 186.
- Marchi, F. A.** Trachomatous Corneal Pannus in Form of Tumor. (3 pl.) Arch. di Ottal., v. 23, p. 611. Brit. Jour. Ophth., v. 1, p. 569. Ophth. Lit., v. 7, p. 94. 186.
- Mardellis.** Isolated Traumatic Paralysis of Abducens. Clin. Opht., v. 22, p. 133. Ann. of Ophth., v. 26, p. 635. 29.
- Marie, P., and Chatélin, C.** Visual Disturbances and Lesions in Intracerebral Optic Fibres. Abst. Jour. Nerv. and Ment. Dis., v. 46, p. 454. 137, 140.
- Marin, M.** Angioma of Conjunctiva of Traumatic Origin. (1 ill. Bibl.) Arch. de Oft. Hisp.-Amer., v. 17, p. 325. 185.
- Marin Amat, M.** Traumatic Subconjunctival Luxation of Lens Without Injury to Iris. (1 ill.) Arch. de Oft. Hisp.-Amer., v. 17, p. 382. 199.
- Markel, J. C.** Entropion Treated with Electrocautery. Penn. Med. Jour., v. 21, p. 120. 172.
- Marks, L. B.** Practical Standards for Factory Illumination. Amer. Jour. Pub. Health, v. 8, p. 363. 237.
- Marlow, S. B.,** see Doubler, F. H.
- Marquez, M.** Marginal Ectasia of Cornea. Siglo Med., v. 64, p. 386. Jour. A. M. A., v. 69, p. 415. 52.
- Malarial Amblyopia.** Arch. de Oft. Hisp.-Amer., v. 17, p. 132. Ann. of Ophth., v. 26, p. 470. 69.
- Extraction of Cataract.** Arch. de Oft. Hisp.-Amer., v. 17, p. 385. 93, 94.
- Ocular Leprosy.** Arch. de Oft. Hisp.-Amer., v. 18, p. 266. 228.
- Martin, H. H.** Retino-choroiditis Juxtapapillaris. Amer. Jour. Ophth., v. 1, p. 132. 115.
- Martinez.** Amaurosis First Sign of Uremia. Espana Oftal., Nov., 1917, p. 16. 230.
- Mason, A. B.** Treatment of Concomitant Squint. Jour. Med. Assn. Georgia, v. 6, p. 223. 26.
- Massey, G. B.** Ionization Treatment of Cancer of Eyelids. (8 ill.) New York Jour. Med., v. 105, p. 731. 195.
- Masuda.** Myopia Statistics. Nippon Gank Zasshi, Nov., 1916. Ophthalmology, v. 13, p. 875. 17.  
History of Rodent Ulcer of Cornea. (7 ill.) Nippon Gank Zasshi, Aug., 1916. Ophthalmology, v. 13, p. 870. 45.
- Acute Disseminated Choroiditis with Scrofuloderma.** (2 ill.) Nippon Gank Zasshi, Jan., 1916. Amer. Jour. Ophth., v. 1, p. 55. 69.
- Central Retinitis.** (1 col. pl. Bibl.) Nippon Gank Zasshi, Feb., April, June, Dec., 1916. Ophthalmology, v. 13, p. 877. 110, 115.
- Syphilitic Disease of Eye Ground and Wassermann Reaction.** Nippon Gank Zasshi, May, 1916.
- Matson, W. F.** Anophthalmia. Ann. of Ophth., v. 26, p. 344. 151.
- Matthews, H.** Atropin in Eye Work. Brit. Jour. Ophth., v. 1, p. 582. 10.
- Maucione, L.** Indication for Arsenobenzol in Ocular Syphilis. (Bibl.) Arch. di Ottal., v. 24, p. 297. 226.
- Maxey, E. E.** Primary Syphilis of Conjunctiva. Pacific Coast Oto. and Ophth. Soc., 1917, p. 15.
- Maxwell, E. M., and Kiep.** Iritis and Cyclitis in Dysentery. (2 charts.) Brit. Jour. Ophth., v. 2, p. 71. 223.
- May, C. H.** Transillumination. Brit. Jour. Ophth., v. 1, p. 136. 2.  
Streptothrix. (Dis.) Arch. of Ophth., v. 46, p. 171. 34.

- Maynard, F. P.** Intracapsular Extraction of Cataract. *Brit. Jour. Ophth.*, v. 1, p. 269. 95.
- Mayou, M. S.** Pigmentation in Lens, Siderosis. *Ophth. Soc. United Kingdom*, v. 36, p. 140. *Brit. Jour. Ophth.*, v. 1, p. 571. 90.
- Pulsating Exophthalmos Following Head Wound.** (Dis.) *Tr. Ophth. Soc. United Kingdom*, v. 37, p. 186. 175.
- Orbital Suppuration.** (8 ill.) *Tr. Ophth. Soc. United Kingdom*, v. 37, p. 191. 179.
- Means, J. H., and Aub, J. C.** Exophthalmic Goiter from Point of View of Metabolism. *Jour. Amer. Med. Assn.*, v. 69, p. 33. 176.
- Meding, C. B.** One Hundred and Three Cataract Operations, 83 in Capsule, with 20 Capsulotomy. *Arch. of Ophth.*, v. 46, p. 330. 95. 99.
- Melland, C. H.** Epidemic Poliomyelitis (Botulism.) *Brit. Med. Jour.*, May 18, 1918, p. 559. 223.
- Menacho, M.** Glaucoma After Dissection for Secondary Cataract. *Arch. d'Opht.*, v. 35, p. 321. *Amer. Jour. Ophth.*, v. 34, p. 118. *Ann. of Ophth.*, v. 26, p. 629. 83.
- Spontaneous Resorption of Cataract.** (1 ill.) *Arch. de Oftal. Hisp.-Amer.*, v. 17, p. 60. 91.
- Medullated Fibres of Retina.** *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 119. 102.
- Congenital Vascular Anomalies of Ocular Fundus.** (25 ill.) *Arch. de Oftal. Hisp.-Amer.*, v. 17, p. 229. *Ann. of Ophth.*, v. 26, p. 638. 102.
- Congenital Pigmentation of Optic Nerve.** (2 ill.) *Ann. d'Ocul.*, v. 154, p. 296. 125.
- Associated Movements of Upper Lid and Jaw.** *Ann. d'Ocul.*, v. 154, p. 240. 164.
- Merida Nicolich.** Neuroparalytic Ocular Syndrome. (Bibl.) *Arch. de Oft. Hisp.-Amer.*, v. 8, p. 183. 232.
- Mestre Medina, D. J.** Trachoma and Lacrimal Affections in High Altitude. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 73. 37.
- Metz, R. B.** Spontaneous Explosion of Artificial Eyes. (2 ill. Bibl.) *Cleveland Med. Jour.*, v. 16, p. 719. 154.
- Ocular Tuberculosis.** *Jour. Ophth. and Oto-Laryngol.*, v. 11, p. 139. 228.
- Metzner, R. and Wolfflin.** Paralysis of Cervical Sympathetic. *Graefe's Arch. f. Ophth.*, v. 91, p. 167. *Ophth. Lit.*, v. 7, p. 35. 56.
- Meyer-Huerlimann.** Acute Exophthalmos with Quincke's Edema. *Corresp.-Bl. f. Schweizer Aerzte*, v. 47, p. 161. 174.
- Mikama.** Ocular Injury from Electric Current. *Nippon Gank Zasshi*, Dec., 1916. *Ophthalmology*, v. 13, p. 877. 195.
- Miller, C. M.** Orbital Abscess within Muscle Cone. *Ann. of Ophth.*, v. 26, p. 260. 180.
- Miller, G. V.** Injury to Eye Complicated with Brain Abscess. (Death.) *Brit. Jour. Ophth.*, v. 1, p. 751. 198.
- Millette, J. W.** Treatment of Cataract at National Military Home. *Amer. Acad. Ophth. and Oto-Laryngol.*, 1916, p. 188. *Ophthalmology*, v. 13, p. 415. 95.
- Mills, L.** Ideal Intracapsular Cataract Extraction. *Arch. of Ophth.*, v. 46, p. 344. 95.
- Mitchell, S.** Making the Ophthalmometer More Helpful. (1 ill.) *Ophth. Rec.*, v. 26, p. 143. 3.
- Mlady.** Cataract from Atmospheric Pressure. *Woch. f. Therap. u. Hyg. d. Auges*, Feb., 1917. 89.
- Monaghan, D. G.** Traumatic Rupture of Iris and Choroid. *Ophth. Rec.*, v. 26, p. 101. 196.
- Traumatic Cataract.** *Ophth. Rec.*, v. 26, p. 100. 213.
- Monbrun, A.** Ossification of Choroid. (2 pl. 1 ill. Bibl.) *Arch. d'Opht.*, v. 35, p. 666. 75.
- Mongel, E. B.** Orbital Cellulitis with Optic Neuritis. *Ann. of Ophth.*, v. 26, p. 370. 179.
- Montgomery, D. W.** Local Treatment of Eczema of Lids. *Interstate Med. Jour.*, v. 24, p. 786. 166.
- Moore, J.** Left Oculomotor Paralysis After Measles in General Tuberculosis. *Clin. Jour.*, v. 45, p. 458. 29.
- Moore, R. F.** Retinitis of Arteriosclerosis. Relation to Renal Retinitis and to Vascular Disease. *Brit. Jour. Ophth.*, v. 1, p. 372. *Amer. Jour. Ophth.*, v. 34, p. 252. 107.
- Pathology of Choroidal Melanomata.** (2 ill.) *Brit. Jour. Ophth.*, v. 1, p. 26. 189.
- Morax, V.** Sympathetic Ophthalmia. (4 ill.) *Ann. d'Ocul.*, v. 154, p. 363. 76.
- Sympathetic Uveitis.** (4 ill.) *Ann. d'Ocul.*, v. 154, p. 426. 76.
- Secondary Glaucoma from Penetrating Wounds of Globe from Splinters.** *Ann. d'Ocul.*, v. 154, p. 11. *Brit. Jour. Ophth.*, v. 1, p. 504. 83.
- Iritis with Intestinal Dysentery.** *Ann. d'Ocul.*, v. 154, p. 45. 41, 61.
- Ocular Injuries from Intracranial Wounds.** *Ann. d'Ocul.*, v. 154, p. 300. 140.
- Herpes of Lids with Antityphoid Vaccination.** *Ann. d'Ocul.*, v. 153, p. 494. 45, 168.
- Treatment of Total Symblepharon.** (9 ill.) *Ann. d'Ocul.*, v. 154, p. 321. 171.
- Ocular Troubles in Lethargic Encephalitis.** (Bibl.) *Ann. d'Ocul.*, v. 155, p. 345. 223.
- Morax, V., and Desauges.** Injury of Lacrimal Apparatus in War. *Ann. d'Ocul.*, v. 154, p. 450. 216.
- Moreau.** Electric Ophthalmia. *Brit. Jour. Ophth.*, v. 1, p. 557. 35.
- Moret.** Ocular Troubles with Spirochetosis Icterohemorrhagica. *Arch. Méd. Belges*, 1917, p. 1105. *Brit. Jour. Ophth.*, v. 2, p. 257. *Amer. Jour. Ophth.*, v. 1, p. 195. 222.
- Moron Ruiz, J.** Advantages and Inconveniences of Suture in Cataract Extraction. *Espana Oftal.*, Sept., 1917, p. 138. 93.
- Morrison, F. A.** Hysteric Amblyopia. *Amer. Jour. Ophth.*, v. 1, p. 338. 233.
- Mosso, G.** Hemeralopia. *Gior. di Med. Mil.*, v. 65, p. 401. 117.
- Mougeot, A.** Oculo-cardiac Reflex in Bradycardia. *Progres Méd.*, v. 32, p. 249. 234.



- Moulton, H. Cataract Extraction. Jour. Ark. Med. Soc., v. 13, p. 185. 99.
- Angiosclerosis of Retinal Blood Vessels. Jour. Missouri State Med. Assn., v. 14, p. 401. 108.
- Muirhead, J. B. Extraocular Pressure and Myopia. Brit. Jour. Ophth., v. 1, p. 202. 17.
- Müller, L. Trephining Sheath of Optic Nerve for Choked Disc. Wien. med. Woch., 1916, No. 32. Arch. of Ophth., v. 47, p. 109. Jour. Amer. Med. Assn., v. 67, p. 2044. 129.
- Müller, L., and Thanner, C. Eye Affections Treated with Parenteral Injection of Non-specific Protein-milk. Med. Klin., v. 12, p. 1120. Amer. Jour. Ophth., v. 34, p. 172. Jour. A. M. A., v. 68, p. 2041. 7.
- Mulock-Houwer, A. W. Operation for Zonular Cataract. Nederl. Tijdschr., v. Genees, 1917, p. 1058. 88.
- Murray, G. D. Mine Injuries to Eye as Related to Compensation. Penn. Med. Jour., v. 20, p. 695. 248.
- Murzin, A. M. Echinococcus of Orbit. Vestnik Oftal., v. 33, p. 143. 180.
- Mygind, H. Otogenous Intracranial Complications with Optic Neuritis, etc. Ophthalmology, v. 13, p. 527. 130.
- Nagano. Pyoktanin in Dacryocystitis. Nippon Gank Zasshi, Sept., 1916. 161.
- Nagle, F. O. Etiology of Retrobulbar Optic Neuritis. Jour. Ophth. Otol. and Laryngol., Jan., 1917, p. 30. 126.
- Senile Changes in Eyeball. Jour. Ophth. Otol. and Laryngol., 1917, p. 660. 230.
- Nakamura. Optical Illusions. (Ill.) Nippon Gank Zasshi, Oct., 1916. 142.
- Navarrete y Mas. Myiasis of Conjunctiva. Arch. de Oftal. Hisp.-Amer., v. 17, p. 273. Ann. of Ophth., v. 26, p. 637. 234.
- Netter, A. Epidemic Lethargic Encephalitis. Abst. Jour. Amer. Med. Assn., v. 70, p. 1964. 154.
- Newman, E. A. R. Irrigation After Extracapsular Extraction of Cataract. Indian Med. Gaz., 1917, p. 280. 94.
- Nogawa. Tubercle Formation in Parenchymatous Keratitis. (1 ill. Bibl.) Nippon Gank Zasshi, Dec., 1917. 228.
- Nordenson, J. W. Rules for Correction of Astigmatism. Brit. Jour. Ophth., v. 1, p. 148. 18.
- Northrop, H. S. Duboisin Poisoning. Jour. Ophth. Otol. and Laryngol., June, 1917, p. 432. 10.
- Ochi, Striped Atrophy in Periphery of Retina. Nippon Gank Zasshi, June, 1917. 114.
- Anatomy of Orbit. (12 ill.) Nippon Gank Zasshi, Nov., 1917. 174.
- O'Connor, D. F. Glioma Retinae and Atrophia Bulbi. (4 ill.) Arch. of Ophth., v. 46, p. 298. 191.
- O'Connor, R. Nonsuture Ocular Tendon Shortening, Forty Operations. (1 ill. Dis.) Calif. State Jour. Med., v. 15, p. 232. 25.
- Oda. Lid Forceps. (2 ill.) Nippon Gank Zasshi, Nov., 1916. 13.
- Odeneal, T. H. Elliot Trephine Operation and Iridotaxis for Glaucoma. Ann. of Ophth., v. 26, p. 601. 85.
- Oehlecker, F. Bone Prothesis. Zeit. f. Chirurg., v. 43, p. 617. 181.
- Oguchi. Panophthalmitis due to Unknown Bacillus. (1 ill.) Nippon Gank Zasshi, July, 1916. Ophthalmology, v. 13, p. 871. 154.
- Ohm, J. Miners' Nystagmus. Graefe's Arch. f. Ophth., v. 91, Ht. 2. Ophth. Lit., v. 7, p. 36. 27.
- Okabe. Retinal Periphelebitis. (1 pl.) Nippon Gank Zasshi, March, 1916. 116.
- Okayama. Eye Grounds in Retinal Embolism. (3 ill.) Nippon Gank Zasshi, July, 1916. 111.
- von Hippel's Disease. (2 col. pl. 1 ill.) Nippon Gank Zasshi, April, 1916. Ophthalmology, v. 13, p. 869. 115.
- Olivieri, E. M., and Ronchi. Injections of Boiling Water for Exophthalmic Goiter. Abst. Jour. Amer. Med. Assn., Sept. 15, 1917, p. 949. 172.
- Oloff, H. Injuries to Eyes from Ink and Anilin, etc. Münch. med. Woch., 1916, No. 31. 196.
- Psychic Ocular Affections Resulting from War. Heidelberg Ophth. Cong., 1916. Arch. of Ophth., v. 47, p. 112. 233.
- Onishi. Knife for Dissection of Cornea in Trephining. Ophthalmology, v. 13, p. 539. 13.
- Opin. Benign Tumor of Choroid. (3 ill.) Ann. d'Ocul., v. 154, p. 724. 190.
- Oppenheim. Arterial Tension and Oculocardiac Reflex. Progres Méd., Feb. 19, 1917. Med. Rec., v. 91, p. 913. 234.
- Orendorff, O. Removal of Bullet in Orbit Ten Years. (1 ill.) Amer. Jour. Ophth., v. 1, p. 114. 211.
- Orlow, K. Prophylaxis and Therapy of Sympathetic Ophthalmia. Ann d'Ocul., v. 154, p. 630. 77.
- Ormond, A. W. Causes and Treatment of Iritis. Lancet, June 23, 1917, p. 957. 65, 66, 72.
- Osborne, A. Double Atrophy of Optic Nerve. Clin. Opht., v. 22, p. 254. 132.
- Lumbar Puncture in Papillary Stasis. Clin. Opht., v. 22, p. 252. 128.
- Burn of Cornea. Clin. Opht., v. 22, p. 255. 195.
- Osborne, E. S. Ocular Examination in Diagnosis of Constitutional Disorders. Georgia Med. Assn., v. 6, p. 231. 6.
- Oström, L. Prevention of Infection of Cornea. Ophthalmology, v. 13, p. 239. 46.
- Oulton. Comparative Infrequency of Simple Iritis and Iridocyclitis Among Egyptians. (Dis.) Ophth. Soc. Egypt, 1915, p. 23. 61.
- Ourgaud. Loss of Corneal Substance Restored by Conjunctival Graft. Arch. d'Opht., v. 35, p. 435. Brit. Jour. Ophth., v. 1, p. 504. 48.
- Ovio, G. Red Vision. Ann. di Ottal. e Clin. Ocul., v. 1, p. 179. 105.



- Pacheco Luna, R.** Acute Iritis After Dysentery. *Amer. Jour. Ophth.*, v. 1, p. 658. 224.
- Filarial Tumors.** *Amer. Jour. Ophth.*, v. 1, p. 122. 236.
- Pagenstecher.** Action of X-ray on Growth of Eye. Origin of Rosettes of Retina. *Heidelberg Ophth. Cong.*, 1916. *Ann. d'Ocul.*, v. 154, p. 175. *Arch. of Ophth.*, v. 46, p. 596. 219.
- Paradies, T.** Argaldin in Ophthalmology. *Clin. Optht.*, v. 22, p. 274. 10.
- Parenteau.** Homeopathic Treatment of Cataract. *Clin. Optht.*, v. 21, p. 712. *Brit. Jour. Ophth.*, v. 1, p. 582. 92.
- Parker, W. R.** Present Status of Sclerocorneal Trephining for Relief of Glaucoma. *Arch. of Ophth.*, v. 46, p. 1. 86.
- Loss of Vision Completely Relieved by Sellar Decompression. (3 ill.) *Arch. of Ophth.*, v. 46, p. 528. 144.
- Ocular Changes in Multiple Sclerosis. *Jour. Mich. State Med. Soc.*, v. 16, p. 172. 232.
- Parrott, J. M.** Morgagnian Cataract and Cataract followed by Expulsive Hemorrhage. *Charlotte Med. Jour.*, v. 76, p. 112. 90, 97.
- Parsons, J. H.** Apocritic Principle and Evolution of Visual Perceptions. *Tr. Ophth. Soc. United Kingdom*, v. 37, p. 333. *Brit. Jour. Ophth.*, v. 1, p. 426. 133, 146.
- Retino-choroidal Ruptures. *Brit. Jour. Ophth.*, v. 1, p. 495. 196.
- Paton, L.** Iritis and Dental Infection. *Lancet*, June 23, 1917, p. 957. 61.
- Gunn's Dots. *Brit. Jour. Ophth.*, v. 2, pp. 85, 188. 116.
- Pattee, J. J.** Operation for Trichiasis. *Ophth. Rec.*, v. 26, p. 588. 171.
- Patterson, J. A.** Tubercle of Conjunctiva. (1 pl.) *Ann. of Ophth.*, v. 26, p. 76. 41.
- Polycythemia. *Ann. of Ophth.*, v. 26, p. 346. 228.
- Diseases of Eye from Lesions of Mouth and Throat. *Colo. Med.*, v. 14, p. 197. 230.
- Paul.** Reaction of Cornea to Vaccines. *Heidelberg Ophth. Cong.*, 1916. *Ann. d'Ocul.*, v. 154, p. 172. 45.
- Pearson, A.** Employment of Blind. *Tr. Ophth. Soc. United Kingdom*, v. 37, p. 133. 242.
- Peck, W. H.** Treatment of Vitreous Opacities. *Ill. Med. Jour.*, v. 32, p. 186. 102.
- Pereyra, G.** Streptotrichosis of Palpebral Conjunctiva. (1 pl.) *Brit. Jour. Ophth.*, v. 1, p. 557. 33.
- Traumatic Panophthalmitis of Rapid Development. (2 pl.) *Arch. di Ottal.*, v. 23, p. 631. 153.
- Perez Bufil.** Advantages of Iridectomy in Cataract Extraction. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 541. 93.
- Perry, R. W.** Safety First in Cataract Operations. *Ophth. Rec.*, v. 26, p. 555. 97.
- Peter, L. C.** Campimeter vs. Arc Perimeter. *Amer. Acad. Ophth. and Oto-Laryngol.*, 1916, p. 94. *Ophth. Rec.*, v. 26, p. 79. 5.
- Petersen.** Oculocardiac Reflex. *Hospitalstidende*, Feb., 1917. 234.
- Petit, P.** Technic of Extirpation of Lacrimal Gland. *Ann. d'Ocul.*, v. 153, p. 475. 159.
- Burns by Liquid Caustic. *Ann. d'Ocul.*, v. 153, p. 472. *Brit. Jour. Ophth.*, v. 1, p. 113. 196.
- Peyrecave.** Detachment of Retina. *Clin. Optht.*, v. 22, p. 87. *Brit. Jour. Ophth.*, v. p, p. 712. 120.
- Pfingst, A. O.** Tumors of Lacrimal Gland. *Amer. Jour. Ophth.*, v. 1, p. 131. 184.
- Pfister, F.** Blindness Cured by Intranasal Operation. *Amer. Jour. Ophth.*, v. 34, p. 151. 231.
- Phillips, W. H.** Vaccine Serums and Tuberculins. *Jour. Ophth. Otol. and Laryngol.*, Jan., 1917, p. 19. 7.
- Ocular Complications with Acidosis. *Jour. Ophth. Otol. and Laryngol.*, July, 1917, p. 489. 230.
- Pickard, H.** Metastatic Panophthalmitis. *Amer. Jour. Ophth.*, v. 34, p. 308. 153.
- Pieron, H.** Cortical Hemianopsia. *Ann. d'Ocul.*, v. 154, p. 454. 139.
- Pierson, P. H.** Tuberculosis of Eye. *Calif. State Med. Jour.*, v. 15, p. 74. 228.
- Pincshon, G.** Ocular Complications Following Use of Optochin. *Berl. klin. Woch.*, 1916, No. 18. *Arch. of Ophth.*, v. 46, p. 590. 11.
- Pincus.** Wounds of Occipital Region. *Heidelberg Ophth. Cong.*, 1916. *Arch. of Ophth.*, v. 47, p. 112. 140.
- Pissarello, C.** Ulcerated Gumma of Lids. *Arch. di Ottal.*, v. 23, p. 379. *Brit. Jour. Ophth.*, v. 1, p. 441. 169.
- Pockley, G. A.** Perforating Injuries of Eyeball, by Magnetizable Bodies. *Med. Jour. Australia*, Jan., 1918, p. 66. 211.
- Pol, G. J.** Illumination for Fine Hand Work. *Abst. Jour. A. M. A.*, v. 70, p. 66. 239.
- Pollnow.** Optochin Intoxication. *Deut. med. Woch.*, 1916, p. 557. *Arch. of Ophth.*, v. 46, p. 589. 122.
- Pollock, W. B. I.** Dissolving Senile Cataract in Early Stage. *Glasgow Med. Jour.*, v. 6, p. 208. 91.
- Leber's Disease with X-ray of Sella Turcica. *Tr. Ophth. Soc. United Kingdom*, v. 37, p. 247. 131.
- Effect of Cinematograph on Eyes of Children. *Glasgow Med. Jour.*, v. 5, p. 206. *Brit. Jour. Ophth.*, v. 1, p. 579. 238.
- Pond, E. A.** Dacryocystitis and Treatment. *Amer. Jour. Ophth.*, v. 34, p. 190. 162.
- Pontius, P. J.** Shot Injury and Scleral Injury. *Penn. Med. Jour.*, v. 21, p. 203. 209.
- Pooley, G. H.** Removal of Foreign Bodies by Means of Giant Magnet. *Brit. Jour. Ophth.*, v. 1, p. 30. 210.
- Pooley, G. H., and Wilkinson, G.** Unilateral Blindness with Cystic Distention of Maxillary Antrum. *Jour. Laryngol. Rhin. and Otol.*, London, v. 32, p. 81. 231.
- Poser, M.** Ophthalmic Test Lenses and Portable Opto-phorometer. *Arch. of Ophth.*, v. 46, p. 69. 15.
- Posey, W. C.** Superficial Corneal Opacity with Epithelial Dystrophy. (1 pl.) *Arch. of Ophth.*, v. 46, p. 113. 44, 50.

- Secondary Glaucoma. *Penn. Med. Jour.*, v. 20, p. 684. 84.
- Dislocation of Lens Into Anterior Chamber. *Ann. of Ophth.*, v. 26, p. 222. 87.
- Sinus Disease Simulating Orbital Tumor. *Ophth. Rec.*, v. 26, p. 49. 92.
- Bilateral Coloboma of Lids. *Amer. Jour. Ophth.*, v. 1, p. 145. 163.
- Congenital Ptosis and Lack of Upward Rotation of Eyes. *Ophth. Rec.*, v. 26, p. 49. 165.
- Blepharoplasty. *Ophth. Rec.*, v. 26, p. 49. 173.
- Orbital Tumor. *Ann. of Ophth.*, v. 26, p. 372. 180.
- Result of Operation for Mucocoele of Frontal and Ethmoidal Cells. *Amer. Jour. Ophth.*, v. 1, p. 205. 180.
- Operation for Contracted Socket. *Amer. Jour. Ophth.*, v. 1, p. 282. 182.
- Adenoma of Orbit. *Penn. Med. Jour.*, v. 21, p. 482. 192.
- Sarcoma of Orbit. *Amer. Jour. Ophth.*, v. 1, p. 507. 194.
- Epithelioma of Orbit. *Amer. Jour. Ophth.*, v. 1, p. 282. 194.
- Industrial Injuries to Eyes. *Penn. Med. Jour.*, v. 20, pp. 505, 515. 215.
- Perforating Wound of Globe. *Amer. Jour. Ophth.*, v. 1, p. 359. 215.
- Pottenkofer, W. Narcosis. *Munch. med. Woch.*, 1916, p. 108. 12.
- Potter, P. Comfort Test as Method of Refraction. (2 ill.) *Ann. of Ophth.*, v. 26, p. 391. 15.
- Powell, A. L. Artificial Light and the Medical Profession. *Med. Times*, v. 45, p. 286. 236.
- Poyales, F. Convergent Strabismus in New Born. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 192. *Ann. of Ophth.*, v. 26, p. 472. 25.
- Bacteriologic Diagnosis of Ocular Tuberculosis. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 629. 227.
- Pratt, J. A. Total Symblepharon. *Ann. of Ophth.*, v. 26, p. 500. 42.
- Prendergast, D. A. Ethmoiditis Complicated by Orbital Symptoms. *Cleveland Med. Jour.*, v. 15, p. 802. 180.
- Prentice, C. F. Bicylindrical Refraction. *Ophth. Rec.*, v. 26, p. 14. 14.
- Precision Trial Case and Test-frame. (1 ill.) *Ophth. Rec.*, v. 26, p. 187. 14.
- Prevedi, G. Transparent Cysts of Ciliary Margin. (Bibl.) *Arch. di Ott.*, v. 23, p. 660. 184.
- Price, N. W. Simple Rapid Perimeter. (3 ill.) *Ophth. Rec.*, v. 26, p. 244. 5.
- Pringle, J. A. Multiple Aneurysms of Retinal Arteries. (1 col. pl.) *Brit. Jour. Ophth.*, v. 1, p. 87. 102, 103, 116.
- Pritchard, E. Amaurosis After Violent Convulsions in Children. *Brit. Jour. Ophth.*, v. 2, p. 294. 232.
- Prosser. A Color Ward. *Lancet*, Oct. 6, 1917, p. 542. 237.
- Puiggari, M. I. Juxtapapillary Retrochoroiditis. *Prensa Med. Argentina*, v. 4, p. 30. *Abst. Jour. A. M. A.*, v. 69, p. 762. 115.
- Purtscher. Traumatic Retinal Angiopathy. *Klin. M. f. Augenh.*, v. 56, Ht. 2-3. 106.
- Ralston, W. Glass Sphere Transplantation. *Texas State Jour. Med.*, v. 12, p. 394. 158.
- Ramsay, A. M. An Oculo-palpebral Prothesis. (4 ill.) *Lancet*, May 12, 1917, p. 721. 183.
- Ramsey. Burn of Lids. (Dis.) *Jour. Ophth. and Oto-Laryngol.*, v. 11, p. 51. 195.
- Rand, C. W. Amaurotic Family Idiocy. *Calif. State Jour. Med.*, v. 15, p. 502. 114.
- Rebay, H. Vaccine Therapy of Trachoma. *Bol. de la Soc. Oftal. de Buenos Aires*, v. 4, p. 413.
- Reber, W. Ocular Therapeutics. *Brit. Jour. Ophth.*, v. 1, p. 294. 9, 11.
- Ring Scotoma in Relation to Choroidal and Optic Nerve Disease. (5 ill.) *Amer. Acad. Ophth. and Oto-Laryngol.*, 1916, p. 13.
- Reede, E. H. Status of Exophthalmic Goiter. *Med. Rec.*, v. 91, p. 450. 176.
- Reeder, J. E. Iridocyclitis and Focal Infection. *Jour. Iowa Med. Soc.*, v. 7, p. 303. 61.
- Reeve, R. A. Regarding Optometry. *Dominion Med. Mo.*, v. 48, p. 25. 251.
- Reeves, P. Evolution of Vision. *Jour. Ophth. Otol. and Laryngol.*, Oct., 1917, p. 647. 135.
- Reichmann, F. Disorders of Pupil in Dementia Precox. *Amer. Jour. Ophth.*, v. 34, p. 254. 57.
- Richard, P. Treatment of Ocular Syphilis with Galyl. *Clin. Opht.*, v. 22, p. 460. *Amer. Jour. Ophth.*, v. 1, p. 689. 226.
- Richards, A. F. Trachoma. *Jour. Tenn. State Med. Assn.*, v. 9, p. 470. 39.
- Richardson. Spectacles for Soldiers. *Brit. Med. Jour.*, April 6, 1918, p. 406. 240.
- Riddoch, G. Dissociation of Visual Perceptions Due to Occipital Injuries, Especial Reference to Appreciation of Movement. *Brain*, v. 40, p. 15. 135.
- Rider, P. R. Equal Parallax Curve for Frontal and Lateral Vision. *Science*, 1917, p. 213. 134.
- Ridley, N. C. Pigment Mass in Anterior Chamber. *Birmingham Med. Rev.*, v. 81, p. 47. 55.
- Ridley, N. C., and Harries-Jones, E. H. Subconjunctival Injections. *Birmingham Med. Rev.*, v. 81, p. 47. 106.
- Ring, G. O. Coloboma of Iris with Congenital Cataract. *Ophth. Rec.*, v. 26, p. 113. 59.
- Sudden Obstruction of Retinal Circulation in Cardio-renal Disease. *Ophth. Rec.*, v. 26, p. 70. 110.
- Recurrent Neuroepithelioma. (3 ill.) *Amer. Ophth. Soc.*, v. 15, p. 217. *Ophth. Rec.*, v. 26, p. 437. 191.
- Epithelioma of Lid and Cheek. *Sec. on Ophth. Coll. Phys.*, Oct., 1917. *Amer. Jour. Ophth.*, v. 1, p. 57. 194.
- Risley, S. D. Juvenile Glaucoma. *Ann. of Ophth.*, v. 26, p. 208. 81.



- Increased Refraction Following Increased Tension of Globe. *Ophth. Rec.*, v. 26, p. 148. 17, 83.
- Opacity of Both Lenses with Diabetes. *Ophth. Rec.*, v. 26, p. 50. 90.
- Sudden Blindness Due to Wood Alcohol. *Ann. of Ophth.*, v. 26, p. 221. 124.
- Enucleation with Insertion of Globe in Sclera and Capsule. *Ophth. Rec.*, v. 26, p. 53. 158.
- Ophthalmology in Philadelphia. *Amer. Jour. Ophth.*, v. 1, pp. 28, 216. 253.
- Roberts, E. R., and Harris, T. G. Empyema of Ethmoid and Frontal Sinuses, Perforation Into Orbit. *Laryngoscope*, 1917, p. 93. 179.
- Robinson, J. R. Diabetic Lenticular Opacities. *Colo. Ophth. Soc.*, Oct., 1917. *Ophth. Rec.*, v. 26, p. 635. 90.
- Hemorrhage of Vitreous. *Ophth. Rec.*, v. 26, p. 637. 101.
- Rochat, G. F. Rapid Phase of Spontaneous Nystagmus. *Nederl. Tijdschr.*, v. Geneesk., 1917, p. 1062. 27.
- Roche, C. Paralysis of Cervical Sympathetic After Injury. *Arch. d'Opht.*, v. 35, p. 339. *Brit. Jour. Ophth.*, v. 1, p. 503. 213.
- Rochester, A. S. Etiology of Iritis. *Ophth. Rec.*, v. 26, p. 201. 71, 72.
- Rochon-Duvigneaud, A. Reformation in Teaching Ophthalmology. *Ann. d'Ocul.*, v. 154, p. 1. 249.
- Rodman, H. Blindness Due to Ethmoiditis; Cured. *New York Med. Jour.*, v. 106, p. 316. 231.
- Roelofs, C. O. Ocular Torticollis. *Arch. d'Opht.*, v. 35, pp. 380, 382. 21.
- Precise Method of Determining Position of Eyes in Muscle Trouble. *Arch. d'Opht.*, v. 35, p. 507. 21.
- Rogers, S. L. Statistics of Blindness in United States. *Calif. State Med. Jour.*, v. 15, p. 135.
- Rollet and Velter, E. Chorio-retinal Lesions from War Wounds. (1 pl.) *Arch. d'Opht.*, v. 35, p. 385. *Brit. Jour. Ophth.*, v. 1, p. 504. 211.
- Ronne, H. Thrombosis of Central Retinal Veins. *Hospitalstidende*, 1916, p. 196. 111.
- Acute Retrobulbar Neuritis with Defect in Visual Field. *Klin. M. f. Augenh.*, 1916, Feb. *Arch. of Ophth.*, v. 47, p. 109.
- Rosenhain, W. The Cantor Lectures on Optical Glass. *Brit. Jour. Ophth.*, v. 1, p. 203. 14.
- Rousseau, F. Paralysis of Motor Nerves of Eye. *Ann. d'Ocul.*, v. 153, p. 530. 24.
- Rovinsky, A. State Examination and Treatment of Eye Diseases in School Children. *New York Med. Jour.*, v. 106, p. 978. 241.
- Rowe, E. H. Choroiditis After Chronic Alveolar Abscess Treated with Vaccine Therapy. *Arch. of Ophth.*, v. 46, p. 251. 61, 72.
- Roy, D. Infection After Iridotaxis for Glaucoma. *Trans. Ophth. Soc.*, v. 15, p. 126. *Arch. of Ophth.*, v. 47, p. 42. 85.
- Lacrimal Stenosis in Infants. *Charlotte Med. Jour.*, v. 75, p. 78. 160.
- Removal of Foreign Bodies from Eyeball and Orbit. *Amer. Ophth. Soc.*, v. 15, p. 56. 203.
- Rucknich, C. A. Study of Visual Rhythm. *Psychol. Bull.*, v. 14, p. 46. 104.
- Rumsey, C. L. Tumor of Eyelid. (3 ill.) *Jour. Ophth. Otol. and Laryngol.*, March, 1917, p. 177. 190.
- Disturbance of Vision from Pelvic Disorders. *Amer. Jour. Inst. Homeop.*, v. 10, p. 1279. 234.
- Sakaguchi. Conjunctivitis Coccidien in Japan. *Nippon Gank Zasshi*, Aug., 1916. *Ophthalmology*, v. 13, p. 871. 34.
- Salterain, J. de. Intraocular Sarcoma in Children. *Abst. Jour. A. M. A.*, v. 70, p. 1129. 190.
- Salomonson, J. K. Paralysis of Double Lateral Conjugate Movements of Eye. *Nederl. Tijdschr.*, v. Geneesk., 1916, p. 1848. 28.
- Sanchez Aguilera, G. Importance of Visual Fields in Ocular Affections. *Arch. de Oft.*, *Hisp.-Amer.*, v. 17, p. 365. 5.
- Sander, P. F. Tubercular Tumor of Orbit. *Ann. d'Ocul.*, v. 154, p. 629. 192.
- Sansum, W. D. Reduction of Intraocular Tension in Glaucoma by Intravenous Glucose Injections. *Jour. A. M. A.*, v. 68, p. 1885. 84.
- Santonoceto, O. The Ergograph After Lucien Howe. *Arch. d'Opht.*, v. 35, p. 382. 24.
- Santos. Blindness in Portugal. *Brit. Jour. Ophth.*, v. 1, p. 201. 252.
- Santos Fernandez, J. Subconjunctival Injections of Cocain in Cataract and Glaucoma Operations. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 80. 12.
- Seventy Clinical Cases of Paralysis of Cranial Nerves. *Bol. de la Soc. de Buenos Aires*, v. 4, p. 127. 28.
- Corneal Opacities. *Bol. de la Soc. Oftal. de Buenos Aires*, v. 4, p. 140. 50.
- Operation for Traumatic Cataract in Adolescents. *Bol. de la Soc. de Buenos Aires*, v. 4, p. 152. 88.
- Is There a Preferable Technic for Cataract Extraction? *Cron. Med. Quir. de la Habana*, v. 43, p. 253. 93.
- Cataract Operation as Done by Spanish and Latin American Surgeons. *Ann. of Ophth.*, v. 26, p. 243. *Ophthalmology*, v. 13, p. 576. 93.
- Technic in Extraction of Cataract. *Es-pana Oftal.*, May, 1917, p. 87. 98.
- Ocular Disturbances Due to Malaria and Quinin. (Bibl.) *Ophth. Rec.*, v. 26, p. 118. 121.
- Lead and Quinin Amblyopia. *Abst. Med. Rec.*, v. 91, p. 1102. 125.
- Voyage to Spain for Ophthalmic Purposes. *Cron. Med. Quir. de la Habana*, Feb., 1918.
- Ophthalmology in Washington, D. C. *Ophthalmology*, v. 13, p. 221.
- Satake. Hemangi endothelioma of Orbit. *Nippon Gank Zasshi*, Sept., 1917. 194.



- Sato.** Atypical Retinitis Circinata. (4 ill., 2 col. pl.) Nippon Gank Zasshi, May, 1917.
- Sattler, C. H.** Pulsating Exophthalmos. Deut. Med. Woch., v. 42, p. 1306. 175.
- Sattler, R.** Unilateral Proptosis Exploratory Operation. Ethmoid Osteoma. Amer. Ophth. Soc., v. 15, p. 238. Arch. of Ophth., v. 47, p. 68. 194.
- Tetanus After Penetrating Injury to Eye-ball. Amer. Ophth. Soc., v. 15, p. 234. 200.
- Savage, G. C.** The Ophthalmic Record. Amer. Jour. Ophth., v. 1, p. 149. 253.
- Sbordone, G.** Simulated Conjunctivitis. Policlinico, Jan. 31, 1917. Brit. Med. Jour., May 19, 1917, p. 653. 34.
- Scarlett, A.** Differentiation of Diplobacilli by Serum Reactions. Ann. d'Ocul., p. 153, p. 485. Brit. Jour. Ophth. v. 1, p. 257. 219.
- Scarlett, H. W.** Diplobacilli in Corneal Ulcers. Arch. of Ophth., v. 46, p. 219. 46.
- Schanz, F.** Diabetic Cataract. Graefe's Arch. f. Ophth., v. 91, p. 238. Ophth. Lit., v. 7, p. 36. 89.
- Scheube.** Nonoperative Treatment of Senile Cataract. Inaug. Diss. Jena. Arch. of Ophth., v. 47, p. 105. 92.
- Schevensteen, A.** Conjunctivitis Produced by Malingering. Clin. Opt., v. 21, p. 595. Amer. Jour. Ophth., v. 34, p. 112. 35.
- Sympathetic Ophthalmia. Ann. d'Ocul., v. 154, p. 495. 76.
- Retino-choroidal Complications in Spirochetosis Icterohemorrhagica. Brit. Jour. Ophth., v. 2, p. 156. 110.
- Schleck, F.** Diathermia and the Eye. Clin. Opt., v. 22, p. 105. 8.
- Prophylaxis of Sympathetic Ophthalmia in War. Heidelberg Ophth. Cong., 1916. Arch. of Ophth., v. 47, p. 104. 75.
- Schliötz, I.** Preequatorial Sclerectomy in Detachment of Retina. Cent. f. p. Augenh., v. 40, p. 149. Ophthalmology, v. 13, p. 513. 120.
- Optochin Amblyopia. Norsk Mag. for Laegevid., v. 78, p. 717. Jour. A. M. A., v. 69, p. 500. 122.
- Schlirmer, O.** Senile Cataract Extraction with Iridocyclitis in Other Eye. Arch. of Ophth., v. 46, p. 167. 90.
- Optic Hallucinations with Hemianopsia. (2 pl. Dis.) Arch. of Ophth., v. 46, p. 247, 278. 141.
- Associated Lid Movements. (Dis.) Arch. of Ophth., v. 46, p. 169. 165.
- Internal Secretions and Eye Diseases. New York State Jour. Med., v. 17, p. 27. 229.
- Schleissinger, F. S.** Ocular Accidents of Labor. Bol. de la Soc. de Oft. de Buenos Aires, v. 4, p. 417. 247.
- Schoenberg, M. J.** Intraspinal and Intracranial Treatment of Luetic Manifestations of Optic Pathways. Arch. of Ophth., v. 46, p. 578. Clin. Opt., v. 22, p. 67. 226.
- Schoute, G. T.** Visual Fields and Choice of Operation in Glaucoma. Arch. d'Opht., v. 34, p. 445. 86.
- Schreiber.** Loss of Vitreous and Its Spontaneous Replacement. Heidelberg Ophth. Cong., 1916. Arch. of Ophth., v. 46, p. 596. 100.
- Optochin Amaurosis. Graefe's Arch. f. Ophth., v. 91, p. 305. Ophth. Lit., v. 7, p. 47. 122.
- Schweinitz, G. E. de, and How, H. W.** Kerato-Iritis in Boy with Polyarthritis. Trans. Coll. Phys. Phila. Sec. on Ophth., 1916, p. 337. 64, 69.
- Pituitary Body Struma, Visual Field and Effects of Organotherapy. Ann. of Ophth., v. 26, p. 368. Arch. of Ophth., v. 46, p. 139. 143.
- Melanosarcoma of Choroid of Unusual Density. Trans. Coll. Phys. Phila. Sec. on Ophth., 1916, p. 352. 189.
- Schwenk, P. N. K.** Secondary Glaucoma. Wills Hosp. Ophth. Soc., March, 1917. Ophth. Rec., v. 26, p. 465. 83.
- Supposed Glaucoma, Sclerectomy with Restoration of Vision. Ophth. Rec., v. 26, p. 53. 83.
- Congenital Cataract. Amer. Jour. Ophth., v. 1, p. 144. 91.
- Plastic Operation for Cicatricial Ectropion. Amer. Jour. Ophth., v. 1, p. 53. 171.
- Operation for Contracted Socket. Amer. Jour. Ophth., v. 1, p. 55. 182.
- Rupture of Choroid from Blow by Owl. Tr. Coll. Phys. Phila., Feb., 1917. 196.
- Scott, L. M.** Eye Strain and Reflex Nervous Troubles. Southern Med. Jour., v. 10, p. 760. 19.
- Sculco, N.** Alleged Cure for Trachoma. Pediatrics, v. 24, p. 540, 1916. Abst. Med. Rec., v. 91, p. 26. 38.
- Sedwick, W. A.** Retinitis Pigmentosa. Colo. Ophth. Soc., April 21, 1917. Ann. of Ophth., v. 26, p. 526. 113.
- Seefelder, R.** Glaucoma. Amer. Jour. Ophth., v. 34, p. 332. 82.
- Seelert.** Isolated Pathologic Sensory Sensation in Cerebral Syphilis. Arch. of Ophth., v. 46, p. 602. 225.
- Seidel.** Krönlein Operation Under Local Anesthesia in Orbital Disease. Graefe. Arch. f. Ophth., v. 91, Ht. 2. Ophth. Lit., v. 7, p. 48. 12.
- Share of Iris in Secretion of Aqueous Humor. Heidelberg Ophth. Cong., 1916. Ann. d'Ocul., v. 154, p. 174. 55.
- Seo.** Trachomatous New Formation in Conjunctiva Resembling Plasmoma. (2 pl.) Nippon Gank Zasshi, Oct., 1916. Ophthalmology, v. 13, p. 874. 40.
- Shackleton, W. E.** Foreign Bodies in Eye. Ohio State Med. Jour., v. 12, p. 798. 206.
- Shafer, J. J.** Diabetic Retinitis. Amer. Jour. Surg., v. 36, p. 67. 113.
- Shahan, W. E.** Effects of Heat on Eye. Sec. on Ophth. A. M. A., 1917, p. 96. Jour. A. M. A., v. 69, p. 1193. 8.
- Shahan, W. E., and Lamb, H. D.** Histologic Effects of Heat on Eye. Scientific Amer. Suppl., v. 82, p. 298. 8.

- Shanker, H.** Suppuration After Cataract Extraction. *Indian Med. Gaz.*, v. 52, p. 281. 91.
- Shannon, C. E. G., and Hughes, L. W.** Lupus of Conjunctiva and Cornea. *Ann. of Ophth.*, v. 26, p. 255. 41.
- Shannon, J. R.** Moore's Ulcer Four Months After Recovery of Eye. (Dis.) *Arch. of Ophth.*, v. 46, p. 167. 46.
- Aneurysm of Internal Carotid Artery; Effect Upon Vision.** (3 ill.) *Arch. of Ophth.*, v. 46, p. 518. 177.
- Sharpe, W.** Pressure Signs of Certain Intracranial Conditions seen in Fundus. *Arch. of Ophth.*, v. 46, pp. 320, 363. 145.
- Shastid, T. H.** History of Ophthalmology. *Amer. Encyclo. and Dict. of Ophth.*, v. 7, p. 8525. 253.
- Sherman, H. G.** Methodless Technic for Cataract Operation. *Cleveland Med. Jour.*, v. 16, p. 616. 97.
- Shikano.** Optic Neuritis with Hypophysis Tumor. *Nippon Gank Zasshi*, Jan., 1917. 128.
- Dermoid of Conjunctiva of Lower Lid.** (1 ill.) *Nippon Gank Zasshi*, Sept., 1916. 185.
- Shine, F. W.** Vernal Catarrh Treated with Radium. *Arch. of Ophth.*, v. 46, p. 67. 36.
- Shiosi.** Two Cases of Intradural Tumor of Optic Nerve. *Nippon Gank Zasshi*, Sept., 1916. *Ophthalmology*, v. 13, p. 876. 192.
- Posterior Scleral Growth and Operative Treatment.** *Nippon Gank Zasshi*, Dec., 1916. 192.
- Ocular Tuberculosis.** *Nippon Gank Zasshi*, Nov.-Dec., 1917. 227.
- Shoemaker, W. A., and Alt, A.** Diagnosis of Sympathetic Ophthalmia. *Amer. Jour. Ophth.*, v. 33, p. 369. 79.
- Shumway, E. A.** Hyaline Bodies in Optic Nerve Head. *Ann. of Ophth.*, v. 26, p. 380. 126.
- Round Celled Sarcoma of Choroid.** *Ann. of Ophth.*, v. 26, p. 368. 188.
- Contusion of Eye with Rupture Extending Across Optic Disc.** (Bibl.) *Ophth. Rec.*, v. 26, p. 167. 197.
- Silberstern, P.** Acquired Blindness. *Wien. klin. Woch.*, v. 29, p. 985. 244.
- Simon de Guilleuma, J. M.** Iodin in Treatment of Cataract. *Clin. Opht.*, v. 21, p. 603. *Brit. Jour. Ophth.*, v. 1, p. 455. *Ann. of Ophth.*, v. 26, p. 463. 9.
- Electroionic Treatment of Ocular Affections.** *Clin. Opht.*, v. 21, p. 643. *Brit. Jour. Ophth.*, v. 1, p. 582. 9, 53.
- Simpson, C. A.** Roentgen Therapy of Exophthalmic Goiter, etc. *Southern Med. Jour.*, v. 10, p. 550. 177.
- Simpson, J. H.** Specific Epipephycitis (Trachoma). *Amer. Jour. Surg.*, v. 31, p. 88. 39.
- Siredey, M. A., and Martin, L.** Double Ophthalmia and Cerebrospinal Fever. *Lancet* Nov. 17, 1917, p. 757. 154.
- Small, C. P.** Aniridia. *Ophth. Rec.*, v. 26, p. 261. 59.
- Visual Requirements of Military Service** *Ann. of Ophth.*, v. 26, p. 325. *Jour. A. M. A.*, v. 68, p. 841. 246.
- Smith, H. A.** Temperature Curve in Early Intraocular Tuberculosis. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 116. 227.
- Smith, H. L.** Bacteria and Iritis. *Roy. Soc. Med. Sec. on Ophth.*, June 13, 1917, *Lancet*, June 23, 1917, p. 957. 64.
- Smith, J. J.** Clinical Observations of Cataract Operations. *Ann. of Ophth.*, v. 26, p. 404. 98.
- Eye, Ear, Nose and Throat at Recruiting Depot.** *New York Med. Jour.*, v. 108, p. 69. 246.
- Smith, J. R.** Laceration of Eyeball with Eyelash Driven Into Lens. *Ophth. Rec.*, v. 26, p. 623. 208.
- Smith, P.** Blood Pressure in Eye, Its Relation to Anterior Chamber. (40 ill.) *Brit. Jour. Ophth.*, v. 1, pp. 4, 657. 80.
- Smith, S. M.** Intracranial Complications of Aural Disease. *Amer. Jour. Ophth.*, v. 1, p. 352. 232.
- Snell, A. C.** Visual Economics as Applied to Workmen's Compensation Law in New York. *N. Y. State Jour. Med.*, v. 18, p. 284. 248.
- Sobhy, M.** Absolute Glaucoma. (2 ill. Dis.) *Ophth. Soc. Egypt*, 1915, p. 80. 86.
- Streptothrix Infection of Conjunctiva.** (1 ill.) *Ophth. Soc. Egypt*, 1915, p. 63. 34, 227.
- Sobotky, I.** Iritis and Optic Neuritis After Tonsillitis. *Boston Med. and Surg. Jour.*, v. 176, p. 806. 61.
- Soliman Sayd Abdul-Hamid.** Gangrene of Lids. (5 ill. Dis.) *Ophth. Soc. Egypt*, 1915, p. 54. 167.
- Sollier, P., and Jouset, X.** Retrobulbar Neuritis from Nitro-phenol. (6 ill.) *Clin. Opht.*, v. 22, p. 78. *Ann. of Ophth.*, v. 26, p. 630. 123.
- Sourdille.** Ocular Prosthesis After Injury. *Arch. d'Opht.*, v. 35, p. 356. 182.
- Speciale-Cirincione.** Development of Anterior Chamber of Human Eye. (10 ill.) *Ann. di Ottal. e Clin. Ocul.*, v. 1, pp. 160. 249. 54.
- Osteoma of Orbit.** (9 ill. Bibl.) *Ann. di Ottal. e Clin. Ocul.*, v. 1, p. 80. *Ophth. Lit.*, v. 7, p. 83. 192.
- Ophthalmic Service in the Army.** *Ann. di Ottal. e Clin. Ocul.*, v. 1, p. 240. 246.
- Speed, K.** Decompression for Hypophyseal Tumor. *Surg. Clin. of Chicago*, v. 1, pp. 711, 715. 144.
- Spencer, F. R.** Optic Atrophy of Traumatic Origin. *Amer. Jour. Ophth.*, v. 1, p. 61. 132.



- Clover Leaf Cataracts. *Ophth. Rec.*, v. 26, p. 253. 88.
- Massive Hemorrhage Into Vitreous. *Ophth. Rec.*, v. 26, p. 252. 101.
- Prolapse of Iris. *Ann. of Ophth.*, v. 26, p. 340.
- Interstitial Keratitis Due to Acquired Lues. *Ophth. Rec.*, v. 26, p. 105. 49.
- Tuberculosis of Retinal Vessels. (1 ill. Bibl.) *Amer. Acad. Ophth. and Oto-Laryngol.* 1916, p. 60. *Ophthalmology*, v. 13, p. 225. 108.
- Congenital Ptosis. (Dis.) *Ophth. Rec.*, v. 26, p. 254. 165.
- Steel in Orbit. *Amer. Jour. Ophth.*, v. 1, p. 343. 205.
- Role of Ductless Glands in Ophthalmology. (Dis.) *Amer. Jour. Ophth.*, v. 1, p. 100. 229.
- Spiller, W. G. Ocular Manifestations in Syphilis of Nervous System. *Amer. Jour. Med. Sc.*, v. 154, p. 523. 225.
- Spiller, W. G., and de Schweinitz, G. E. Effect on Papilledema of Removal of Small Quantity of Cerebrospinal Fluid by Lumbar Puncture. *Jour. Nerv. and Mental Dis.*, v. 46, p. 10. 129.
- Spohn, G. W. Working Knowledge of Ophthalmology for General Physician. *Jour. Indiana State Med. Assn.*, v. 10, p. 286.
- Stähli, J. Movements of Eyes by Tests Applied to Ears. *Corresp.-Bl. f. Schweizer Aerzte*, v. 47, p. 849. *Jour. A. M. A.*, v. 69, p. 676. 21.
- Stapleton, E. A. Strabismus and its Treatment. *Albany Med. Ann.*, v. 38, p. 71. 25.
- Dacryocystitis. *Albany Med. Ann.*, v. 39, p. 22. 163.
- Panophthalmitis Following Childbirth. *Albany Med. Ann.*, v. 38, p. 176. 154.
- Stark, H. H. Unusual Vitreous Opacities. (Bibl.) *Arch. of Ophth.*, v. 46, p. 39. 101.
- Stauffer, F. Relation of Deformities or Diseases of Nose and Throat to Diseases of Eye, Especially Asthenopia. *Ann. of Ophth.*, v. 26, p. 13, 147. 230.
- Stein, J. M. Orbital with Ethmoid Disease. *Penn. Med. Jour.*, v. 21, p. 341. 180.
- Stein, I. F. Sophol in Prevention of Ophthalmia Neonatorum. *Ann. of Ophth.*, v. 26, p. 411. 32.
- Stephenson, S. Pseudoneoplastic Form of Interstitial Keratitis. *Brit. Jour. Ophth.*, v. 1, p. 745. 49.
- Anterior Ethmoiditis in Young Subjects. *Brit. Jour. Ophth.*, v. 2, p. 416. 231.
- Stern, Osteoma of Orbit. *Zeit. f. Augenh.*, 1916, Ht. 2-3. 193.
- Steyn, H. J. Contraction of New Formed Connective Tissue in Eye. *Amsterdam Thesis. Arch. d'Ophth.*, v. 35, p. 383. 219.
- Stieren, E. Epithelioma of Limbus. (3 ill.) *Amer. Jour. Ophth.*, v. 1, p. 278. 186.
- Stilwill, H. R. Exophoria Due to Muscle Operations. *Ann. of Ophth.*, v. 26, p. 355. 27.
- Xerosis of Conjunctiva. *Ophth. Rec.*, v. 26, p. 100. 43.
- Primary Optic Atrophy. *Amer. Jour. Ophth.*, v. 1, p. 141. 132.
- Eye Injury. *Ophth. Rec.*, v. 26, p. 473. 201.
- Stilwill, H. R., and Coover, D. H. Probable Abscess of Orbit. *Ophth. Rec.*, v. 26, p. 473. 180.
- Stirling, A. W. Blockage of Trephine After Elliot Operation. *Arch. of Ophth.*, v. 46, p. 352. 86.
- Stirling, J. W. Subconjunctival Epidermal Cyst. *Canadian Med. Assn. Jour.*, v. 7, p. 785. 43.
- Stock. Glasses and Shooting. *Heidelberg Ophth. Cong.*, 1916. *Arch. of Ophth.*, v. 46, p. 602.
- Stören. Hereditary Transmission of Color of Eyes. *Ophthalmology*, v. 13, p. 493. 217.
- Story, J. B. Sir William Robert W. Wilde. *Brit. Jour. Ophth.*, v. 2, p. 65. 253.
- Strader, G. L. Cataract Following Iridocyclitis. *Ophth. Rec.*, v. 26, p. 255. 90.
- Strickler, D. A. Unusual Cataracts. *Colo. Ophth. Soc.*, Jan. 20, 1917. *Ophth. Rec.*, v. 26, p. 249. 88.
- Toxic Amblyopias. *Ophth. Rec.*, v. 26, p. 102. 124.
- Stuckey, E. J. Circumocular Filariasis. (1 pl.) *Brit. Jour. Ophth.*, v. 1, p. 542. 235.
- Suganuma. Primary and Hereditary Luetic Kerato-Parenchymatosa. *Nippon Gank Zasshi*, March, 1916. *Ophthalmology*, v. 13, p. 541. 48.
- Suganuma and Hoshiyama. Vital Staining of Cornea. (4 pl.) *Nippon Gank Zasshi*, July, 1916. *Ophthalmology*, v. 13, p. 539. 43.
- Suker, G. F. Excision of Tarsus in Trachoma. (7 ill.) *Tr. Acad. Ophth. and Oto-Laryngol.*, 1916, p. 100. 39.
- Parenchymatous Keratitis. *Ophth. Rec.*, v. 26, p. 263. 49.
- Ventricular Injections for Tabetic Optic Atrophy. *Ann. of Ophth.*, v. 26, p. 316. 130.
- Juvenile Taboparesis with Optic Atrophy. *Ophth. Rec.*, v. 26, pp. 27, 316. 132.
- Optic Neuritis from Tonsillar Infection. *Ophth. Rec.*, v. 26, p. 278. 130.
- Ocular Muscle Symptom in Exophthalmic Goiter. *Jour. A. M. A.*, v. 68, p. 1255. 177.
- Sunseri, F. The Porges' Reaction in Ophthalmology. *Ann. di Ottal. e Clin. Ocul.*, v. 1, p. 97. *Ophth. Lit.*, v. 7, p. 95. *Brit. Jour. Ophth.*, v. 1, p. 570. 225.
- Susita. Iris Dilator in Man. *Nippon Gank Zasshi*, July, 1916. 60.
- Sweet, W. M. Copper in Vitreous. *Trans. Coll. Phys. Phila. Sec. on Ophth.*, 1916, p. 347. 204.
- Swift, G. W. Alveolar Abscess. Its Relation to Eye Diseases. *Pacific Coast Oto-Ophth. Soc.*, 1917, p. 56. 61, 62, 63.



- Swinerton, L. D.** Physical Training of Blind. Boston Med. and Surg. Jour., v. 176, p. 803. 244.
- Sym, W. G.** James Wardrop. (1 ill.) Brit. Jour. Ophth., v. 2, p. 401. 252.
- Symns, J. L. M.** Mirror Writing. Practitioner, v. 100, p. 283. 135.
- v. Szily, A.** Fundus in War Wounds. Heidelberg Ophth. Cong., 1916. Ann. d'Ocul., v. 154, p. 166. 1.
- Pathology of Lacrimal Ducts with Radiography. Heidelberg Ophth. Cong., 1916, Arch. of Ophth., v. 47, p. 88. 151.
- Atlas of Ophthalmology in War. F. Enke, Stuttgart. Ann. d'Ocul., v. 154, p. 555. 214.
- Anaphylaxis with Ocular Pigment. Klin. M. f. Augenh., v. 56, pp. 79, 197. Arch. of Ophth., v. 46, p. 590. 220.
- Talmey, M.** Restoration of Sight in Hyper-mature Cataract with Glaucoma. (5 ill.) New York Med. Jour., v. 105, p. 401. 90.
- Taylor, F. E., and Fleming, N. B.** Bilateral Glioma of Retina with Multiple Metastases. (5 ill. Bibl.) Brit. Jour. Ophth., v. 1, p. 92. 191.
- Taylor, L. H.** Interesting Book on "Eie-sight." Ophth. Rec., v. 26, p. 445. 253.
- Taylor, S. J.** Diphtheritic Membranous Con-junctivitis Following Squint Operation. Lancet, Sept. 1, 1917, p. 348. 33.
- Serous Irido-cyclitis. Lancet, June 30, 1917, p. 1014. 61.
- Dilator of Pupil in Cataract Extraction. Brit. Jour. Ophth., v. 2, p. 119. 93.
- Teal, F. F.** Effect of Sinus Disease Upon Eye. Nebraska State Med. Jour., v. 2, p. 279. 230.
- Management of Corneal Injuries. Ne-braska State Jour. Med., v. 2, p. 234. 203.
- Eye in Dementia Precox. Amer. Jour. Ophth., v. 1, p. 185. 231.
- Tenner, A. S.** Trachoma a Civil and a Mil-itary Problem. Jour. Amer. Med. Assn., v. 69, p. 227. 38.
- Monocular Optic Neuritis Following Pneu-monia. Arch. of Ophth., v. 46, p. 576. 130, 244.
- Hypophyseal Disease. Arch. of Ophth., v. 46, p. 577. 144.
- Terrien, F.** Improvement of Stump for Pro-thesis. Arch. d'Opht., v. 35, p. 524. Brit. Jour. Ophth., v. 1, p. 762. 158.
- Astigmatism and Contusion of Globe. Arch. d'Opht., v. 35, p. 689. 198.
- Foreign Bodies Tolerated in Eye. (1 pl.) Arch. d'Opht., v. 35, p. 397. Brit. Jour. Ophth., v. 1, p. 763. 207.
- Repair of Wounds of Conjunctiva and Lids. (2 ill.) Arch. d'Opht., v. 35, p. 350. 216.
- Terson, A.** Ocular Reactions in Death. Arch. d'Opht., v. 35, p. 513. Brit. Jour. Ophth., v. 1, p. 778. Amer. Jour. Ophth., v. 34, p. 274. 6.
- Atropin Conjunctivitis. Clin. Opht., v. 21, p. 422. Ann. of Ophth., v. 26, p. 141. 34.
- Orbital Inflammations in Infant. Arch. d'Opht., v. 35, p. 739. 179.
- Tenonitis from Rheumatism and Gout. Paris Méd., v. 18, p. 391. 179.
- Teulières, M.** Functional Disability from Aphakia in War. Clin. Opht., v. 22, p. 31. Ann. of Ophth., v. 26, p. 468. 89, 248.
- Effect of Gases on Visual Apparatus. Arch. d'Opht., v. 35, p. 403. Brit. Jour. Ophth., v. 1, p. 503. 195.
- Teulières and Ourgaud.** Corneal Graft with Pedicle. Arch. d'Opht., v. 35, p. 499. 13.
- Theobald, S.** Chief Function of Oblique Muscles of Eyes. Sec. on Ophth. A. M. A., 1917, p. 38. 22.
- Thomas, H. G.** Etiology and Treatment of Glaucoma. Ophthalmology, v. 13, p. 582. 83.
- Thomas, W. S.** Convenient Device for Test-ing Vision. (1 ill.) U. S. Naval Bull., v. 11, p. 533. 5.
- Thompson, H. M.** Effect of Intestinal Stasis on Eye Especially Iritis. Jour. Ophth. and Oto-Laryngol., v. 11, p. 343. 61.
- Iridocyclitis Secondary to Pyorrhea Alve-olaris. Ophth. Rec., v. 26, p. 591. 61.
- Glaucoma Simplex in Myope with Low Blood Pressure. Ophth. Rec., v. 26, p. 304. 84.
- Treatment of Cataract During Early Stages. (Bibl.) Ann. of Ophth., v. 26, p. 47. 155. 91.
- Descemetitis Following Cataract Extrac-tion. Ophth. Rec., v. 26, p. 592. 97.
- Thompson, LeR.** Iritis. Jour. Ophth. Otol. and Laryngol., Nov., 1917, p. 736. 71.
- Eye Injury Requiring Enucleation. (5 ill.) Jour. Ophth. Otol. and Laryngol., March, 1917, p. 167. 210.
- Thompson, W. R.** Treatment of Dacryocy-sitis. Texas State Jour. Med., v. 13, p. 111. 163.
- Thomson, E. S.** Extraction of Cataract from Vitreous. Amer. Jour. Ophth., v. 34, p. 188. 87, 93.
- Tiffany, F. B.** Indian Operation for Cataract. Southern Med. Jour., v. 10, p. 786. 95.
- Tilderquist, D. L.** Prescribing Lenses After Use of Cycloplegic. Jour.-Lancet, 1917, p. 610. 16.
- Timme, W.** Dyspituitarism with Limitation of Visual Fields Relieved by Glandular Therapy. (1 ill.) Arch. of Ophth., v. 46, p. 151. 143.
- Todd, F. C.** Deviation Upward of One Eye Due to Over Action of Superior Oblique, etc. (12 ill.) Amer. Acad. Ophth. and Oto-Laryngol., 1916, 172. Ophth. Rec., v. 26, p. 280. 28.
- Török, E.** Treatment of Detachment of Re-tina with Müller's Resection of Sclera.

- (Bibl.) Tr. Amer. Ophth. Soc., v. 15, p. 74. Arch. of Ophth., v. 46, p. 466. 120.
- Tomosi.** Optic Nerve Atrophy. Nippon Gank Zasshi, Feb., 1917. 131.
- Tooke, F.** The Halifax Disaster. Amer. Jour. Ophth., v. 1, p. 223. 202.
- Tooker, C. W.** Double Congenital Cataract and Total Aniridia. Amer. Jour. Ophth., v. 34, p. 370. 88.
- Localized Suppuration of Canaliculus. Amer. Jour. Ophth., v. 34, p. 369. 160.
- Ocular Chemosis from Ethmoiditis. Amer. Jour. Ophth., v. 34, p. 373. 230.
- Tournay, A.** Pupil Reactions. Bull. d l'Acad. de Méd., v. 77, p. 680. 56.
- Trainor, M. E.** Fundus Examination in Vascular and Brain Disease in General Diagnosis. Jour.-Lancet, v. 37, p. 86. 6.
- Traquair, H. M.** Bitemporal Hemianopsia; Features of Scotoma. (2 pl. 28 ill.) Brit. Jour. Ophth., v. 1, p. 216, 281, 337. 143.
- Venereal Disease and Blindness. Brit. Med. Jour., Nov. 17, 1917, p. 706. 224.
- Trible, G. B.** Ophthalmology as a Specialty Ashore and Afloat. Military Surg., Jan., 1918, p. 37. 247.
- Trimble, C. G.** Circumocular Filariasis. China Med. Jour., May, 1917. 235.
- Tristano, B.** Provoked Conjunctivitis. Arch. di Ottal., v. 24, p. 83. 35.
- Sclerecto-iridectomy. (7 ill.) Arch. di Ottal., v. 24, p. 173.
- Troland, L. T.** Measurement of Visual Stimulation Intensities. Jour. Exp. Psychol., 1917, p. 1. 104, 148.
- Trombetta, E., and Angelucci, A.** Ophthalmic Science and War. Arch. di Ottal., v. 24, p. 6. 246.
- Turner, D.** Extensive Rodent Ulcer Treated with Radium. (2 ill.) Lancet, April 7, 1917, p. 546. 181.
- Turner, J. G.** Dental Sepsis and Iritis. Lancet, June 23, 1917, p. 957. 61, 62.
- Tuto, R.** Injury of Nerves and Paralysis of Externus. Arch. de Oft. Hisp.-Amer., v. 17, p. 202. Ann. of Ophth., v. 26, p. 472. 29.
- Operation for Cataract. Arch. de Oft. Hisp.-Amer., v. 17, p. 134. Ann. of Ophth., v. 26, p. 470. 88.
- Tyrell.** Symmetric Pigmented Changes at Macula. Tr. Ophth. Soc. United Kingdom, v. 37, p. 237. 114.
- Tyson, H. H.** Bilateral Inferior Hemianopsia. (1 ill.) Tr. Amer. Ophth. Soc., v. 15, p. 208. 141.
- Tzytowski, M. L.** Extraction of Cataract in Capsule. Vestnik Oft., Feb., 1915. Ann. d'Ocul., v. 154, p. 626. 100.
- Uhthoff, W.** Lesions of Visual Tracts and Centers in Wounds of Skull. Heidelberg Ophth. Cong., 1916. Arch. of Ophth., v. 47, p. 112. 138.
- Unger, H.** Etiology of Infantile Paralysis. (Bibl.) Klin. M. f. Augenh., v. 60, p. 802. 231.
- Unna, P. G.** Ciliary Blepharitis. Clin. Opht., v. 22, p. 94. Amer. Jour. Ophth., v. 34, p. 225. 166.
- Urayama.** Lymphoma of Tear Sac. (2 ill.) Nippon Gank Zasshi, Sept., 1917. 184.
- Uribe-Troncoso, M.** "Anales de Oftalmologia." Amer. Jour. Ophth., v. 1, p. 207. 253.
- Urria, F. M.** Ocular Therapeutics in Corneal Ulcers. Arch. de Oft. Hisp.-Amer., v. 17, p. 492. 9.
- Utsida.** Lacrimal Apparatus. Ophthalmology, v. 13, p. 546. 163.
- Valentine, J. A.** Leucosarcoma of Choroid with Epithelioma of Lip. Tr. Ophth. Soc. United Kingdom, v. 37, p. 229. Brit. Jour. Ophth., v. 1, p. 540.
- Valettas, A.** Ophthalmoscopic Changes in Leprosy. Klin. M. f. Augenh., 1916, p. 472. Arch. of Ophth., v. 46, p. 586. 228.
- Valli, O.** Experimental Ocular Granuloma. Gior. d. r. Accad. di Med. di Torino, v. 22, p. 360. 186.
- Valois, G.** Oculo-palpebral Prothesis with Mobile Artificial Eye. (2 ill.) Arch. d'Opht., v. 35, p. 556. 156, 184.
- Ocular Prothesis. Ann. d'Ocul., v. 154, p. 356. 158.
- Valois, G., and Rouveix, J.** Orbital Prothesis. Amer. Jour. Ophth., v. 34, p. 4. 183.
- The One-eyed of the War. (1 ill.) Ann. d'Ocul., v. 153, p. 519. 183.
- Van Cleve, E. M.** Saving Sight—Saving Citizens. Amer. Jour. Pub. Health, v. 7, p. 675. 241.
- Vandegrift, G. W.** Retinal Manifestations of Chronic Bright's Disease. Med. Rec., v. 91, p. 893. Amer. Jour. Ophth., v. 34, p. 222. 111.
- Van Hook, W.** Retaining Floor of Orbit in Resection of Superior Maxilla. (6 ill.) Jour. Amer. Med. Assn., v. 69, p. 1140. 181.
- Van Kirk, V. E.** Diagnosis and Treatment of Trachoma. Penn. Med. Jour., v. 20, p. 708. 38.
- Vaughan, H.** Eye Tension and Blood Pressure. Jour. Med. Soc. New Jersey, v. 14, p. 386. 83.
- Velter, E.** Coloboma of Optic Nerve. Arch. d'Opht., v. 35, p. 335. 126.
- Ocular Symptoms in Penetrating Wounds of Skull. 307 pp. 182 ill. Paris, 1917. Ann. d'Ocul., v. 154, p. 553. 212.
- Verderame, F.** Congenital Abducens Paralysis. Ann. di Ottal., v. 44, p. 779. Ophth. Lt., v. 7, p. 95. 29.
- Verheyden.** Tuberculin in Eye Diseases. Brit. Jour. Ophth., v. 2, p. 223. 228.
- Verhoeff, F. H.** Treatment of Hypopyon Keratitis. Sec. on Ophth. A. M. A., 1917,



- p. 78. Jour. A. M. A., v. 68, p. 1964. 47.  
India Ink Infiltration in Corneal Tattooing. Jour. A. M. A., v. 69, p. 1420. 51.  
Treatment of Retinal Separation. Ophth. Rec., v. 26, p. 10. 118.
- Verhoeff, F. H., and Bell, L.** Pathologic Effects of Radiant Energy on Eye. Proc. Amer. Acad. Arts and Sc., v. 51, p. 630. 238.
- Verwey, A.** Plastic Conjunctival Suture and Sympathetic Ophthalmia in Penetrating Wounds of Eye. Clin. Opt., v. 21, p. 625. 77.
- Vest, C. W.** Metastatic Infection in One Eye with Streptococcus Septicemia. Southern Med. Jour., v. 10, p. 740. 154.
- Vidal Fraxanet, J.** Nodular Tuberculosis of Cornea. (7 ill.) Arch. de Oft. Hisp.-Amer., v. 17, p. 453. 49.
- Villasevaglios, G.** Roentgen Rays in Diagnosis of Ocular Diseases. (12 ill.) Arch. di Ott., v. 23, pp. 461, 573. Ophth. Lit., v. 7, p. 84. 3.  
Anophthalmos. (2 ill.) Arch. di Ottal., v. 23, p. 399. 151.
- Virden, J. E.** Buphthalmos in Child of 15 Months. (Dis.) Arch. of Ophth., v. 46, p. 165. 82.
- Vogt, A.** Embryonal Growth Center in Crystalline Lens. Corresp.-Bl. f. Schweizer Aerzte, Oct., 1917, p. 1342. 87.
- Vusi.** Blood and Ocular Changes in Experimental Cholesterinemia. Deut. med. Woch., 1916, No. 30. Ann. of Ophth., v. 26, p. 125. 219.
- Waardenburg, P. J.** Visual Fields and Choice of Operation in Glaucoma. Arch. d'Opht., v. 35, p. 446. 86.  
Crystalloid Formation in Retina. Nederl. Tijdschr., v. Geneesk., 1917, p. 690. 113.
- Wakisaka.** Familial Trachoma in Fisher Village. Nippon Gank Zasshi, Aug.-Oct.-Dec., 1916. Ophthalmology, v. 13, p. 871. 37.
- Walker, C. B.** Neurologic Perimetry, Method of Imitating Daylight with Electric Illumination. Sec. on Ophth. A. M. A., 1917, p. 189. 5.  
Quantitative Perimetry. (12 ill. 3 pl.) Tr. Amer. Ophth. Soc., v. 15, p. 166. 5.
- Walker, C. B., and Cushing, H.** Chiasmal Lesions and Homonymous Hemianopsia with Hypophysis Tumor. (17 ill.) Arch. of Ophth., v. 47, p. 119. 142.
- Walker, C. E.** Treatment of Simple Glaucoma. Ophth. Rec., v. 26, p. 306. 84.
- Walker, S., Jr.** Corneal Transplantation. Sec. on Ophth. A. M. A., 1917, p. 247. 51.
- Wallace, F. E.** Choroiditis. Ophth. Rec., v. 26, p. 589, 590. 66, 67.  
Traumatic Cataract. Ophth. Rec., v. 26, p. 588. 89.  
Retinitis Proliferans. Ophth. Rec., v. 26, p. 589. 109.  
Tuberculosis of Retina. Amer. Jour. Ophth., v. 1, p. 144. 109.
- Symblepharon. Ophth. Rec., v. 26, p. 590. 171.
- Wallace, W.** Conditions Affecting Standard of Vision in Army. Ophth. Soc. United Kingdom, 1917, v. 37, p. 349. 245.
- Wallis, G. F. C.** Papilledema in Relation to Gunshot Fractures of Mandible. Brit. Jour. Ophth., v. 1, p. 492. 127, 142.  
Relation of Optic Nerve and Chiasm to Sphenoid. Brit. Jour. Ophth., v. 1, p. 248. 142.
- Walter, F. J.** Colored Lenses Under Subtropical Conditions. Ophth. Rec., v. 26, p. 146. 240.
- Watanabe.** Trachoma Statistics in Province of Japan. Nippon Gank Zasshi, Oct., 1916. 37.  
Discoloration of Cornea After Injury. (3 ill.) Nippon Gank Zasshi, Sept., 1916. Brit. Jour. Ophth., v. 1, p. 776. 51.  
Pulsating Exophthalmos. Nippon Gank Zasshi, July, 1916. 175.
- Watkyn-Thomas, F. W., and Scott, R. L.** Ethmoidal Injury with Papilledema, Abducens Palsy, etc. Brit. Jour. Ophth., v. 1, p. 484. 127.
- Weber, F. P.** Juvenile Tabetic Bilateral Optic Nerve Atrophy. Brit. Jour. Dis. Child., July, Sept., 1917, pp. 195, 197. 130.  
Cerebral Degeneration Epilepsy, and Amaurosis. Brit. Jour. Dis. Child., v. 14, pp. 176, 267. 141.  
Congenital Word and Letter Blindness. Brit. Jour. Dis. Child., v. 14, p. 183. 134.
- Wechsler, I. S.** Ophthalmic Changes in Tabes and Paresis. New York State Jour. Med., v. 18, p. 304. 232.
- Weekers, L.** Sympathetic Ophthalmia in War. Ann. d'Ocul., v. 154, p. 196. Amer. Jour. Ophth., v. 34, p. 189. 77, 155.  
Rarity of Sympathetic Ophthalmia After War Wounds. Arch. Méd. Belges, v. 70, p. 193. Brit. Jour. Ophth., v. 1, p. 762. 77.  
Lessons from War on Sympathetic Ophthalmia. Brit. Jour. Ophth., v. 1, p. 762. 155.  
Organization of Ophthalmic Service in Army. Ann. d'Ocul., v. 154, p. 569. 246.
- Weekers, L., and Firket, J.** Ocular Manifestations of Spirochetosis Ictero-Hemorrhagica. Arch. d'Opht., v. 35, p. 647. Amer. Jour. Ophth., v. 1, p. 50. 223.
- Weeks, J. E.** Tuberculosis of the Conjunctiva. (Dis.) Arch. of Ophth., v. 46, p. 276. 41.  
Epithelial Proliferation of Cornea. (Dis.) Arch. of Ophth., v. 46, p. 167. 44.  
Buphthalmos in Child Four Months Old. Arch. of Ophth., v. 46, p. 69. 82.  
Glaucoma Associated with Herpes Zoster Frontalis. Arch. of Ophth., v. 46, p. 68. Trans. Amer. Ophth. Soc., v. 15, p. 134. 83.
- Weeks, J. E., May, C. H., and Posey, W. C.** Award of Knapp Medal. Sec. on Ophth., A. M. A., 1917, p. 354.



- Weeks, W. W.** Retinitis Proliferans. *Arch. of Ophth.*, v. 46, p. 271. 109.
- Weerd, A. H. van.** Foreign Bodies in Eye. *Arch. d'Ophth.*, v. 35, p. 507. 203.
- Weidler, W. B.** Pemphigus of Conjunctiva. (Dis.) *Arch. of Ophth.*, v. 46, p. 169. 42.  
Explosion of Snellen Eye in Orbit. (4 ill.) *Ophth. Rec.*, v. 26, p. 19, 40. 183.  
Skin Diseases with Ocular Manifestations. *N. Y. State Jour. Med.*, v. 17, p. 468. 234.
- Weiss, A. P.** Purkinje's Demonstration. *Psychol. Bull. Princeton*, v. 13, p. 442. 104.
- Wells, D. W.** Hantz Binocular Location of Scotoma by Means of Stereoscope. *Jour. Ophth. Otol. and Laryngol.*, Jan., 1917, p. 31. 5.
- Welt-Kakels, S.** Amaurotic Family Idiocy. *Med. Rec.*, v. 91, p. 874. 114.  
Exophthalmic Goiter. *Med. Rec.*, v. 91, p. 1161. 176.
- Wernicke, O.** Total Achromatopsia. *Bol. de la Soc. Oftal. de Buenos Aires*, v. 4, p. 159. *Amer. Jour. Ophth.*, v. 1, p. 362. 149.
- Wessels, L. C.** High Refractive Errors in Children. *Jour. Ophth. Otol. and Laryngol.*, March, 1917, p. 197. 19.
- Wessely, K.** Deposits of Urates in Eye. *Arch. f. Augenh.*, v. 81, p. 149. *Ophthalmology*, v. 13, p. 519. 66, 72.  
Disturbance of Adaptation. *Wien. med. Woch.*, 1916, p. 1463. *Arch. d'Ophth.*, v. 35, p. 636. 116.  
The Eye, in Borchard's "Manual of War Surgery." *Ann. d'Ocul.*, v. 154, p. 565. 213.
- Westphal, A.** Subconjunctival Injections of Thiosinamin in Vitreous Hemorrhage. *Clin. Ophth.*, v. 21, p. 656. *Brit. Jour. Ophth.*, v. 1, p. 582. *Ann. of Ophth.*, v. 26, p. 464. 101.
- Weyers, J. Q. M.** Abscess in Frontal Lobe After Subacute Otitis. *Arch. d'Ophth.*, v. 35, p. 444. 128.
- Wheeler, J. M.** Enucleation of Eye with Implantation of Patient's Fat in Cavity. *Amer. Jour. Surg.*, v. 31, p. 167. 156.  
Intraocular Growth. *Arch. of Ophth.*, v. 46, p. 576. 190.  
Orbital Tumor. *Arch. of Ophth.*, v. 46, p. 368. 193.
- White, Divergent Squint.** *Arch. of Ophth.*, v. 46, p. 367. 28.
- White, D. W., and White, P. C.** Crushing Operation for Trachoma. (8 ill.) *Ophth. Rec.*, v. 26, p. 239. 39.  
Canthoplasty with Special Technic in Trachoma. (6 ill.) *Ophth. Rec.*, v. 26, p. 132. 39. 40.  
New Operation for Ectropion. *Ophthalmology*, v. 13, p. 425. 172.
- White, J. A.** Eye and Nose as Causative Factors of Bad Health. *Va. Med. Semi-Mo.*, v. 22, p. 1. 231.
- White, L. E.** Loss of Sight from Sinus Disease. *Boston Med. and Surg. Jour.*, v. 176, p. 891. 231.
- Whitehead, A. L.** Localization of Foreign Bodies in Eye, and Orbit. (Dis.) *Tr. Ophth. Soc. United Kingdom*, v. 36, p. 63. *Brit. Jour. Ophth.*, v. 1, p. 633. 209.
- Whithead, A. L., and Parsons, J. H.** Foreign Bodies in Eye and Orbit. *Brit. Jour. Ophth.*, v. 1, p. 629. 209.
- Whiting, M. H.** Concussion Changes in Crystalline Lens. *Tr. Ophth. Soc. United Kingdom*, v. 36, p. 167. 197.
- Whiting, M. H., and Goulden, C.** Haab and Small Magnets in Extraction of Intraocular Foreign Bodies. (4 ill.) *Brit. Jour. Ophth.*, v. 1, p. 32. 211.
- Wible, E. E.** Herpes Zoster Ophthalmicus. *Penn. Med. Jour.*, v. 21, p. 120. 168.  
Rhabdomyoma. *Penn. Med. Jour.*, v. 21, p. 481. 192.
- Wieden, D. J.** Vacuum Aspiration Extraction of Cataract in Capsule. *Siglo Med.*, v. 44, p. 533. *Jour. A. M. A.*, v. 69, p. 856. 94.
- Wieden, E.** Trachoma of Cornea. (3 ill.) *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 486. 38.  
Visual Fields in Syphilitic Chorioretinitis and Optic Atrophy. *Arch. de Oft. Hisp.-Amer.*, v. 17, p. 362. 225.
- Wiener, A.** Dacryocystorhinostomy. *Arch. of Ophth.*, v. 46, p. 227. 163.
- Wiener, M.** Operative Method for Relief of Keratoconus. (1 ill.) *Sec. on Ophth. A. M. A.*, 1917, p. 217. 52.
- Wilder, W. H.** Visual Standards of U. S. Army. *Jour. Amer. Med. Assn.*, v. 71, p. 2. 266.  
Medical Problems Connected with Draft. *Jour. A. M. A.*, v. 70, p. 805. 245.
- Willets, E. J.** Prisms in Ophthalmic Practice. *Penn. Med. Jour.*, v. 20, p. 483. 24.  
Melanosarcoma. *Penn. Med. Jour.*, v. 21, p. 421. 186.
- Williams, A. E.** Story of Light House. *Med. Hosp.*, Sept., 1917, p. 203. 244.
- Williams, C. B.** Pasteurization of Corneal Ulcers. *Texas State Jour. Med.*, v. 13, p. 156. 47.
- Wilson, A. D.** Herpes Zoster Ophthalmicus. *So. West Med.*, v. 1, p. 31. 167.
- Wilson, J. A.** Visual Defects, Refractive and Functional. *Glasgow Med. Jour.*, v. 5, p. 211. 238.
- Wilson, S. A. K.** Concussion Injuries of Visual Apparatus of Central Origin. (3 ill.) *Tr. Ophth. Soc. United Kingdom*, v. 37, p. 92. 140.  
See also Kinnier-Wilson, S. A.
- Witherspoon, J. A.** Early Diagnosis of Exophthalmic Goiter. *Texas State Jour. Med.*, v. 13, p. 109. 176.
- Witmer, J.** Congenital Retraction Movement of Eyeball. *Arch. f. Augenh.*, v. 81, p. 200. *Ophthalmology*, v. 13, p. 461. 30.

- Wolff, J.** Aortic Regurgitation with Pulsation of All Small Arteries. (Dis.) Arch. of Ophth., v. 46, p. 168. 107.
- Wood, C. A.** Eye Signs of Mongolian Idiocy. Ophth. Rec., v. 26, p. 226. 116.  
Early History of Ophthalmology in Chicago. Ophthalmology, v. 13, p. 398. 253.
- Wood, C. G. R.** Etiology of Sympathetic Ophthalmitis. Brit. Jour. Ophth., v. 2, p. 27. 76.
- Wood, F. D.** Masks for Facial Wounds. (3 ill.) Lancet, June 23, 1917, p. 946. 182.
- Woodruff, H. W.** Tendon Transplantation of Eye Muscles. Sec. on Ophth. A. M. A., 1917, p. 276. 26.  
Treatment of Membranous Cataract. Ill. Med. Jour., v. 32, p. 164. 98.
- Woods, A. C.** Trypanosome Keratitis Experimental. (3 ill. Bibl.) Arch. of Ophth., v. 46, p. 431. 45.  
Ocular Anaphylaxis, Role of Uveal Pigment. (Bibl. 2 ill.) Arch. of Ophth., v. 46, p. 283. 61.  
Anaphylactic Theory of Sympathetic Ophthalmia. (Bibl.) Arch. of Ophth., v. 46, p. 8. 75.  
Antigen Properties of Uveal Tissue Shown by Complement Fixation. Arch. of Ophth., v. 46, p. 503. 220.  
Sympathetic Ophthalmia. Sec. on Ophth. A. M. A., 1917, p. 133. 220.
- Woods, H.** Diagnostic and Therapeutic Uses of Tuberculin in Uveitis. (6 ill.) Ann. of Ophth., v. 26, p. 224. 61, 72.
- Wootton, H. W.** Treatment of Strabismus. (Dis.) Amer. Jour. Surg., v. 31, p. 85. 26.  
Retinitis Proliferans and Diabetes. Arch. of Ophth., v. 47, p. 208. 113.  
Retinal Detachment. Arch. of Ophth., v. 47, p. 207. 121.
- Worthing, A. G.** Rating Lamps as to Filament, etc. Abst. Bull. Nela Research Lab., Cleveland, O., 1917, p. 215. 6. 237.  
Over-shooting in Tungsten Lamps. Ibid., p. 209. 6.
- Worthing, A. G., and Forsythe, W. E.** Effects of Diffraction Brightness Measurements. Abst. Bull. Nela Research Lab., Cleveland, O., 1917, p. 140. 6.
- Wright, E. W.** Arteriosclerosis of Retinal Vessels. Med. Council, v. 22, p. 31. 108.
- Wright, H. R.** Rare Intraocular Tumor. (7 ill.) Ophth. Rec., v. 26, p. 339. 192.
- Wright, L.** Vocational Work for Blind in Massachusetts. Mod. Hosp., Sept., 1917, p. 201.
- Würdemann, H. V.** Occupational Injuries and Diseases of Eye. Kober and Hanson's "Diseases of Occupation." P. Blakiston's Son and Co., Phila. 215.  
Ophthalmology, 1904-17. Amer. Jour. Ophth., v. 1, p. 209. 253.
- Wyler, J. S.** Corneal Ulcer Produced by Varicella. Jour. A. M. A., v. 68, p. 1476. 45.  
Corneal Tattooing. Jour. A. M. A., v. 69, p. 1902. 51.
- Monocular Optic Neuritis. Amer. Jour. Surg., v. 31, p. 87. 129.
- Wynn, J. J.** Eye Symptoms Secondary to Focal Infection. Jour. Ophth. Otol. and Laryngol., Feb., 1917, p. 123. 71, 72.
- Yawger, N. S.** Familial Head Nystagmus in Four Generations with Ocular Nystagmus. Jour. A. M. A., v. 69, p. 773. 27.
- Yealland, L. R.** Hysteric Disorders of Vision. Lancet, June 22, 1918, p. 874. Amer. Jour. Ophth., v. 1, p. 573. 233.
- Yebara.** Miliary Tuberculosis of Orbit. (1 ill.) Nippon Gank Zasshi, Aug., 1916. Ophthalmology, v. 13, p. 871. 180.
- Youdine.** Ocular Lesions of Plague. Ann. d'Ocul., v. 154, p. 624. Amer. Jour. Med. Sc., 1918, p. 771. 223.
- Young, G.** Macular Perception in Advanced Cataract. Brit. Jour. Ophth., v. 1, p. 362. Amer. Jour. Ophth., v. 1, p. 128. 90.
- Young, H. B.** Treatment of Corneal Ulcers with Superheated Air. Ophth. Rec., v. 26, p. 25. 47.
- Yudkin, A. M.** Ocular Lesions of Leprosy. Amer. Jour. Ophth., v. 1, p. 303. 228.
- Yzerman, A. J.** Paralysis of Right Externus with Otitis and Mastoiditis. Nederl. Tijdschr., v. Geneesk., 1916, p. 190. 29.
- Zaki Seddik.** Late Infection After Sclerocorneal Trephining. (Dis.) Ophth. Soc. Egypt, 1915, p. 71. 86.
- Zarzycki, P.** Ocular Prothesis. Arch. d'Ophth., v. 36, p. 63. 181.
- Zentmayer, W.** Ethylhydrocuprein in Eye Diseases. Amer. Jour. Ophth., v. 34, p. 94. Penn. Med. Jour., v. 20, p. 487. 10.  
Family Congenital Palsy of External Rectus Muscle. Trans. Coll. Phys. Phila., 1916, p. 355. 30.  
Beren's Operation for Symblepharon. Ophth. Rec., v. 26, p. 467. 42.  
Conjunctivo-keratoplasty. Ophth. Rec., v. 26, pp. 522, 585. 48.  
Congenital Anomaly of Optic Nerve and Choroid. Ophth. Rec., v. 26, p. 50. 60, 126.  
Trachoma in Early Cicatricial Stage. Wills Hosp. Ophth. Soc., Dec., 1916. Ann. of Ophth., v. 26, p. 215. 39.  
Hydrophthalmos. Trans. Coll. Phys. Phila. Sec. on Ophth., 1916, p. 385. 82.  
Traumatic Notch in Lens. Sec. on Ophth. Coll. Phys. Phila., Feb. 15, 1917. 87.  
Symmetric Opacities. Penn. Med. Jour. v. 21, p. 203. 88.  
Congenital Cataract. Ann. of Ophth., v. 26, p. 216. 88, 91.  
Retained Hyaloid Sheath. Sec. on Ophth. Coll. Phys. Phila., April, 1917. 101.  
Unusual Types of Familial Retinal Degeneration. Ophth. Rec., v. 26, p. 522. 114.  
Retinal Degeneration. Ann. of Ophth., v. 26, p. 373. 114.  
Heisrath-Kuhnt Operation. Ophth. Rec., v. 26, p. 585. 40.

- The Eye and Endocrine Organs. Sec. on Ophth., A. M. A., 1917, p. 17. Jour. A. M. A., v. 69, p. 1. 114, 229.
- Microphthalmos with Orbital Cyst. Ann. of Ophth., v. 26, p. 363. 178.
- Double Maxwell Operation. Trans. Coll. Phys. Phila., Sec. on Ophth., 1916, p. 385. 182.
- Malignant Growth in Antrum. Penn. Med. Jour., v. 21, p. 202. 194.
- Sarcoma of Orbit. Sec. on Ophth. Coll. Phila., Feb. 15, 1917. 194.
- Injury from Dynamite Cap. Coll. Phys. Phila., Sec. on Ophth., 1917, p. 347. 205.
- Bilateral Intraocular Foreign Body. Ophth. Rec., v. 26, p. 46. 205.
- Tuberculosis of Anterior Segment of Globe. Ann. of Ophth., v. 26, p. 215. 228.
- Ocular Lesions from Oral and Pharyngeal Disease. (Bibl.) Amer. Jour. Ophth., v. 1, p. 247. 230.
- Ziba.** Ectasia of Cornea. (1 ill., 1 col. pl.) Nippon Gank. Zasshi, April, 1916. 52.
- Ziegler, S. L.** Membranous Occlusion of Pupil, Secondary Infection Treated with Phylacogen. Trans. Coll. Phys. Phila., Sec. on Ophth., 1916, p. 352. 57.
- Tuberculous Buphthalmos Treated with Phylacogen and Tuberculin. Trans. Coll. Phys. Phila., Sec. on Ophth., 1916, p. 352. 82.
- Sarcoma of Iris. Trans. Coll. Phys. Phila., Sec. on Ophth., 1916, p. 353. 187.
- Foreign Body in Sclera. Trans. Coll. Phys. Phila., Sec. on Ophth., 1916, p. 350. 205.
- Ocular Signs and Symptoms Associated with Intranasal Lesions. Amer. Jour. Ophth., v. 1, p. 353. 230.
- Zimmer, C. P.** Trachoma. Clin. Opht., v. 21, p. 723. Ann. of Ophth., v. 26, p. 466. 37.
- Double Metastatic Cyclitis Following Buphthalmic Plague. Clin. Opht., v. 22, p. 30. Brit. Jour. Ophth., v. 1, p. 689. Ann. of Ophth., v. 26, p. 468. 69.
- Zimmermann, C.** Pathology of Glaucoma. Ophthalmology, v. 13, p. 588. 83.
- Zipkin, D.** Influence of Intermittent Light on Retina. Lausanne, 1915. Imprimerie de l'Universite, 12 p., 8vo. 104.



# Index of Subjects

- Abducens, 24, 28, 29.
- Abscess, 20, 61, 72, 198.
  - of caruncle, 163.
  - orbital, 128, 180.
- Accidents of occupation, 215, 247.
- Accommodation, 16, 20, 70.
- Achromatopsia, 126, 149.
- Acidosis, 230.
- Acuteness of vision, 3, 126, 128, 144.
- Adaptation, 117, 118.
- Adduction, 178.
- Adenoids, 234.
- Adenoma, 192.
- Adolescence, 27.
- Adrenalin, 60, 84.
- Advancement, 25.
- After-cataract, 83, 98.
- Age, 150, 217.
- Air, 47.
- Albumin, 112.
- Albuminuric retinitis, 107, 111, 112.
- Alcohol, 121, 131.
- Alexia, 134.
- Altitude, 37.
- Amaurosis. See Blindness.
  - hysteric, 90.
- Amaurotic family idiocy, 114.
- Amblyopia, 121, 261.
  - See also Toxic amblyopias.
- Ambulance service, 252.
- Anaphylaxis, 61, 75, 219, 220.
- Anatomy, cornea, 43.
  - ocular muscles, 21.
- Anesthesia, general, 12.
  - local, 11, 12.
- Aneurysm, 103, 125, 176.
- Angioid streaks in retina, 113.
- Angioma, 185, 193.
- Angiopathy, 106.
- Angiosarcoma, 188.
- Angiosclerosis, 108.
- Anilin, 196.
- Animal carbon, 11.
- Aniridia, 58, 73.
- Ankyloblepharon, 164.
- Anomalies, 24, 50.
  - choroid, 60.
  - fundus, 102.
  - iris, 57, 73, 102.
  - lids, 163.
  - optic nerve, 60, 126.
  - retina, 102.
  - vitreous, 100, 203.
- Anophthalmos, 151, 152.
- Anopsia, 139, 141.
- Anterior chamber, 54, 96.
  - pigment in, 55.
- Antiseptics, 10.
- Antityphoid inoculation, 45, 168, 222.
- Antrum of Highmore, 199.
- Aphakia, 248.
- Apis mellifica, 92.
- Apocritic principle, 133.
- Aqueous, 55, 103.
- Arcus juvenilis, 50.
- Argaldin, 10.
- Argyll-Robertson pupil, 56, 164, 232.
- Arsenic, 1, 226.
- Arsenobenzol, 226.
- Arterial pulsation, 107.
- Arteriosclerosis, 107, 134.
- Arthritis, 64, 224.
- Artificial eyes, 156, 182, 183, 184.
  - explosion of, 154, 183.
  - illumination, 236, 239, 240.
- Asthenopia, 18, 20.
- Astigmatism, 17, 18, 98, 198.
- Atrophy of choroid, 74, 114.
  - conjunctiva, 42.
  - eyeball, 191.
  - iris, 1, 72, 102, 105.
  - optic nerve, 130, 131.
  - retina, 114.
- Atropin, 10, 34, 92.
- Autointoxication, 61, 74, 158.
- Aviation, 135, 246.
- Avulsion of eyeball, 194, 213.
- Bacteria, 64.
- Bandage, 13.
- Barraquer's operation, 156.
- Beren's operation, 42.
- Bicyclindric refraction, 14.
- Bilious fever, 108.
- Binocular vision, 21, 22.
  - lens, 21.
- Birth injuries, 213.
- Blennorrhoea, 31, 32.
- Blepharitis, 166.
- Blepharochalasis, 234.
- Blepharoplasty, 173, 174.
- Blepharospasm, 233.
- Blepharopathy, 233.
- Blind, books for, 243.
  - education of, 201, 243, 244.
  - physical training of, 242, 244.
  - writing for, 242.
- Blindness, 241.
  - acquired, 244.
  - color, 131, 147, 149.
  - definition of, 243.
  - monocular, 183.
  - prevention of, 241.
  - simulated, 6.
  - snow, 238.
- Blind-spot, 142.
- Blood, 178.
  - cyst.
  - pressure, 6, 80, 84, 107.
- Blue sclera, 52, 53.
- Botulism, 223.
- Bradycardia, 234.
- Brain disease, 6, 198.
  - tumor, 145, 146.
- Bright's disease, 111.
- Brittle bones, 52, 53.
- Bulgarian bacillus, 38.
- Buphthalmos, 82.
- Burns, 13, 195.
- Campimeter, 5, 147.
- Canaliculus, abscess of, 160.
- Canal of Schlemm, 79.

- Canthoplasty, 39, 40.  
 Capsulotomy, 98.  
 Carbon monoxid gas, 232.  
 Carcinoma, 190.  
 Care of blind, 241, 242, 243, 244.  
 Cartilage, 182.  
 Carotid, 175.  
 Caruncle, 163.  
 Cataract, 57, 90, 92, 97, 98.  
   absorption of, 91.  
   after, 83, 98.  
   clover-leaf, 88.  
   congenital, 87, 88.  
   couching for, 92, 101.  
   delirium after, 97.  
   diabetic, 89, 90.  
   extraction, 93, 94, 95, 108.  
     sepsis in, 92.  
   glass-blowers, 89.  
   hypermaturation, 90.  
   incipient, 91, 92.  
   intracapsular extraction of, 93, 94, 95, 98, 99.  
   juvenile, 57.  
   Morgagnian, 90, 97.  
   pathogenesis of, 88.  
   polar, 197.  
   resorption of, 91.  
   secondary, 90, 98.  
   senile, 91.  
   traumatic, 89.  
   treatment of, 87, 91.  
   zonular, 87, 88.  
 Cats, 33, 97.  
 Caustics, 196.  
 Cautery, 172.  
 Cavernous sinus, 181, 231.  
 Cellulitis, 179.  
 Centers, see Visual Centers.  
 Central fixation, 134.  
 Cervical sympathetic, 56, 213.  
 Chalazion, 170.  
 Chemotherapy, 11.  
 Choked disc, 1, 128, 129.  
 Cholesterin, 219.  
 Choroid, absence of, 60.  
   anomaly of, 60.  
   coloboma of, 60.  
   ossification of, 75.  
   tumor of, 187, 188.  
 Choroidal atrophy, 74, 114.  
 Choroiditis, 60, 64, 66, 67, 72.  
 Chorio-retinitis, 115.  
 Chorio-retinitis juxtapapillaris, 115.  
 Cilia, 208.  
 Ciliary body, 71, 72.  
 Cinematograph, 24, 238.  
 Claude Bernard-Horner Syndrome, 213, 233.  
 Coagulation, electrothermic, 194.  
 Cocain, 10, 12, 80, 83.  
 Collosol argentum, 47.  
 Collyria, 9.  
 Coloboma of choroid, 60.  
   Fuchs', 102.  
   lids, 163.  
   iris, 59, 102.  
   optic nerve, 126.  
 Color, and sound, 135.  
   blindness, 131, 146, 147, 149.  
   of eyes, 217.  
   of letters, 135.  
   sensation, 16, 104, 135.  
   vision, 146.  
   of wards in hospital, 237.  
 Colored glasses, 240.  
 Comfort test, 15.  
 Compensation, 247, 248.  
 Compression of eyeballs, 3.  
 Concussion, 19, 105, 139, 140, 197.  
 Conjunctiva, 31.  
   filariasis of, 235.  
   lupus of, 41, 169.  
   nutrition of, 230.  
   sarcoma of, 186.  
   shrinking of, 42.  
   tuberculosis of, 41.  
   xerosis of, 43.  
 Conjunctival flap, 48.  
   graft, 48.  
   hemorrhage, 198.  
   suture, 39, 77.  
   tumors, 185, 186.  
 Conjunctivitis, 31, 41.  
   atrophying, 42.  
   atropin, 34.  
   catarrhal, 33.  
   coccidian, 34.  
   diabetic, 34.  
   diphtheritic, 33.  
   follicular, 37.  
   from cat's fur, 33, 223.  
   gonorrheal, 32.  
   ipecac, 34.  
   Parinaud's, 41.  
   pneumococcus, 32, 33.  
   provoked, 34, 35.  
   squirrel-plague, 33.  
   tetryl, 35.  
   vernal, 36.  
 Conservation of vision, 239, 241.  
 Contusion, 196, 198.  
 Convergence, 18.  
 Convulsions, 232.  
 Copper, 204.  
 Cornea, 49, 177.  
   anatomy of, 43.  
   calcification of, 218.  
   degeneration of, 50.  
   deposits in, 44.  
   fibroma of, 186.  
   laceration of, 199, 202.  
   lupus of, 41, 169.  
   operations on, 13, 48, 51.  
   staining of, 43, 46, 51.  
   suppuration of, 177.  
 Corneal anomaly, 50.  
   dystrophy, 44.  
   ecstasia, 52.  
   graft, 13.  
   herpes, 44, 45.  
   knife, 13.  
   opacity, 51.  
   plasmoma, 40.  
   proliferation, 44.  
   suture, 93.  
   syphilis, 48, 49, 50.  
   tuberculosis, 49.  
   transplantation, 51.  
   tumors, 186.  
   ulcers, 45, 46.

- Corpus callosum, 128.
- Corrosive sublimat, 196.
- Couching, 92, 101.
- Cranial deformity, 102, 131, 141.
- Craniotomy, 213.
- Credé method, 32.
- Crookes' glasses, 240.
- Crossed cylinders, 15.
- Crystalline deposits, 218.
- Crystalline lens, 87.
  - couching for, 92, 101.
  - dislocation of, 87, 199.
  - embryology of, 87.
  - injury of, 87, 197, 203.
  - prolapse of, 199.
- Cyanid of mercury, 9.
- Cyclitis, 57, 64.
- Cycloplegics, 15, 16, 17.
- Cysticercus, 235.
- Cyst, anterior chamber, 55.
  - blood, 178.
  - ciliary margin, 184.
  - echinococcus, 180.
  - eyelid, 43.
  - hydatid, 235.
  - optic nerve, 191.
  - orbit, 178.
  - subconjunctival, 43.
- Cystotomy, 98.
  
- Dacryocystitis, 90, 160, 161, 162.
- Dacryocystorhinostomy, 161, 163.
- Dark room, 1.
- Dazzling, 115.
- Death, 2, 6.
- Decompression, 127, 128, 144, 213.
- Deformity of skull, 102, 131, 141.
- Defective mentally, 220.
- Definition of blindness, 243.
- Delirium, 97.
- Dementia precox, 57, 231.
- Dental disease, 20, 61, 62, 126, 225, 230.
- Dermoid, 178, 184, 185.
- Descemetitis, 97.
- Desiccation, 8, 9, 195.
- Detachment of retina, 118, 120.
- Diabetes, 34, 112, 113.
- Diagnosis, 6, 24, 129.
- Diaphanoscopy, 2, 189.
- Diathermia, 8.
- Diffraction, 6.
- Diffusing glassware, 237.
- Dionin, 91.
- Diphtheria, 154, 224.
- Diplopia, 190.
- Discission, 83, 91, 98.
- Dislocation of eyeball, 154.
  - of lens, 87, 199.
- Disseminated sclerosis, 232.
- Dissociation, 135.
- Divergence, 28.
- Dressings, 13.
- Drüsen, 113.
- Drugs, 7, 80, 103.
- Duboisin, 10.
- Ductless glands, 52, 113, 114, 229.
- Dysentery, 41, 61, 223, 224.
- Dyspituitarism, 142.
- Dystrophy, 44, 50.
  
- Ear, 22, 230, 251.
- Echinococcus, 180, 235.
- Eclipse blindness, 114.
- Economics, 241.
- Ectasia, 52.
- Ectropion, 171, 172, 216, 235.
- Eczema, 166, 234.
- Edema, 234.
- Education, 239, 244, 249.
- Electric ophthalmia, 35.
  - injury, 132.
- Electroionic treatment, 172.
  - magnet, 208, 210.
  - therapy, 9.
- Electrothermic coagulation, 194.
- Elephantiasis, 171.
- Embolism, 110, 111.
- Embryotoxon, 50.
- Emetin, 35.
- Empyema, 179.
- Encephalitis, 129, 223.
- Endocrine organs, 52, 113, 114, 229.
- Endorbital osteomata, 192.
- Endothelioma, 185, 186.
- Enophthalmos, 178, 194.
- Entropion, 172.
- Enucleation, 155, 210.
- Eosinophilia, 35.
- Epilepsy, 141, 233.
- Epinephrin, 170.
- Episcleritis, 53.
- Epithelial dystrophy, 44.
- Epithelioma, 184, 186, 194.
- Ergograph, 24.
- Erysipelas, 236.
- Erythropsia, 146.
- Eserin, 80, 84.
- Ethmoiditis, 129, 130, 179, 230.
- Ethylhydrocuprein, 10, 122.
- Evisceration, 155.
- Examinations, 249.
- Exophoria, 24.
- Exophthalmos, 24, 174, 192, 229.
- Exostosis of orbit, 139.
- Explosion of artificial eye, 154.
- Extirpation of sac, 159.
- Eyeball, 151.
  - dislocation of, 154.
  - loss of, 248.
  - retraction of, 178.
- Eyestrain, 19, 20, 27, 233, 239.
  
- Fat, deficiency of, 50.
  - implantation, 156.
- Fatigue, ocular, 104.
- Fibrolysin, 11.
- Fibroma, 186, 192.
- Field of vision, 5, 126, 138, 139, 141.
- Filaria, 236.
- Filariasis, 235.
- Filtration, 79.
- Fluorescein, 46.
- Focal infection, 61, 62, 64, 72.
- Forceps, 13, 23.
- Foreign body, 202, 208, 214.
- Fovea, 214.
- Fracture of skull, 127, 141.
- Fragilitas ossium, 52, 53.
- Fundus, 111, 145, 214.
- Fusion, 21, 22, 27.



- Galyi, 226.  
 Gangrene, 167.  
 Gas injury, 35, 195, 232.  
 General diseases, 68:  
   practitioner, 234.  
 Glands, ductless, 52, 113, 114, 229.  
 Glandular therapy, 143.  
 Glare, 239.  
 Glass, colored, 240.  
   optical, 14.  
   protective, 240, 246.  
   sphere, 158.  
 Glasses for army, 246.  
 Glaucoma, 79, 81, 84.  
   causes, 83.  
   congenital, 82.  
   haloes, 84.  
   juvenile, 81.  
   operations for, 85, 86.  
   pathology, 80.  
   primary, 84.  
   secondary, 84.  
 Glioma, 142, 146, 190, 191, 192.  
 Gliosarcoma, 191.  
 Glucose, injections, 84.  
 Goggles, 98, 240.  
 Goiter, 24, 176, 229.  
 Gonorrhea, 224.  
 Gout, 65.  
 Grafts, 13, 48, 156, 182.  
 Granuloma, 186.  
 Grattage, 40.  
 Gumma, 67, 128, 169, 181.  
 Gunn's dots, 116.  
 Gunshot wounds, see Shot Wounds.
- Haitz chart, 5.  
 Halifax disaster, 239.  
 Hallucinations, 141, 233.  
 Headache, 19, 233.  
 Heat, therapy, 8.  
 Hemangioma, 185, 194.  
 Hemeralopia, 116, 118, 150.  
 Hemiachromatopsia, 137.  
 Hemianopsia, 137, 138, 139, 140, 142.  
 Hemorrhage, 90, 96, 101, 125, 158, 196, 202.  
   conjunctival, 105, 198.  
   intraocular, 96, 101.  
   retinal, 108.  
   vitreous, 101, 196.  
 Heredity, 25, 37, 53, 88, 103, 191, 217, 218, 220.  
 Hering's theory, 148.  
 Herpes zoster, 44, 45, 83, 167, 168, 232.  
 Heterochromia, 57.  
 Heterophoria, 24.  
 Heterotropia, see Strabismus.  
 Hiccup, 3.  
 High frequency current, 36.  
 Hippel's disease, 115.  
 History, 241, 252, 253.  
 Hole in macula, 105, 115.  
 Holocain, 83.  
 Homatropin, 83.  
 Homeopathy, 92.  
 Hospitals, 252.  
 Hutchinson's teeth, 132, 225.  
 Hyaline bodies, 126.  
 Hyalitis, asteroid, 101.  
 Hyaloid artery, 55, 58.  
   membrane, 101.  
   sheath, 114.  
 Hydatid cyst, 235.  
 Hydrophthalmos, 81, 82.  
 Hygiene, 6, 236.  
   school, 19.  
 Hyperopia, 16.  
 Hypophysis, 142.  
 Hypopituitarism, 142.  
 Hypotony, 80.  
 Hysteria, 90, 142, 233.
- Idiocy, 114.  
 Illumination, 1, 2, 4, 236, 239.  
 Illusions, 105, 142.  
 Implantation, 156, 158.  
 Indirect vision, 134.  
 Industrial disease, 215, 247.  
   compensation, 247, 248.  
 Infection, 33, 38, 45, 46, 61, 62, 83, 86, 97,  
   126, 129, 224.  
 Injections, boiling water, 172.  
   glucose, 84.  
   parenteral, 7, 38.  
   subconjunctival, 9, 12, 91.  
   ventricular, 130, 226.  
 Injuries, birth, 213.  
   brain, 127, 141.  
   chemical, 195.  
   cranial, 140.  
   electric, 132, 195, 203.  
   from anilin, 196.  
   from brass, 203.  
   from burns, 13, 195.  
   from chloroform, 196.  
   from cilia, 208.  
   from contusions, 19, 105.  
   from copper, 205.  
   from corrosive sublimat, 196.  
   from explosion, 196, 204, 205.  
   from gas, 35, 195, 232.  
   from heat, 195.  
   from ink, 196.  
   from iron, 211.  
   from lead, 200.  
   from light, 88, 195, 237.  
   from shot, 211, 213.  
   from spectacles, 185, 202.  
   from steel, 203, 206, 209.  
   from wood, 208.  
   industrial, 215, 247.  
   of cornea, 195, 201, 208.  
   of ethmoid, 127.  
   of iris, 203.  
   of lens, 87, 197, 203.  
   of lids, 202.  
   of optic nerve, 197.  
   of orbit, 208.  
   of retina, 106.  
   of sclera, 202.  
   of skull, 249.  
   of tracts and centers, 212.  
   of vitreous, 101, 201, 205, 209.  
   penetrating, 101, 199, 201.  
   psychic, 233.  
   self-inflicted, 6, 14, 34, 118, 245.  
   war, 77, 155, 214.  
 Insanity, 114.  
 Institution for blind, 244.  
 Instruments, 13, 23.  
 Insurance, 201.

- Internal secretions, 52, 113, 114, 229.
- Interstitial, see Parenchymatous.
- Intracapsular extraction, 93, 94, 95, 98, 99.
- Intracranial disease, 6, 198.
- Intraocular tumor, 188.
  - hemorrhage, 96, 101.
- Inverted images, 115.
- Iodin, 9.
- Iodides, 91, 92.
- Ionization, 9, 195.
- Ipecac, 34.
- Iridectomy, 86, 93.
- Irido-sclerectomy, 85.
- Iridochoroiditis, 69, 73.
  - see Uveitis.
- Iridocyclitis, 73, 90, 98, 194.
- Iridocycloplegia, 70.
- Iridotaxis, 85.
- Iris, 105.
  - anomalies, 57.
  - atrophy, 1, 102, 105.
  - coloboma, 59.
  - color of, 57, 218.
  - dilator, 60, 93.
  - pigment, 57.
  - tumors of, 187.
- Iritis, 64, 65, 67.
  - gonorrheal, 66.
- Iron, goggles, 240, 246.
  - injury, 211.
- Irrigation, 94, 153.
- Jaundice, 222.
- Jaw movements, 164.
- Juvenile arcus, 50.
  - cataract, 57.
  - glaucoma, 81.
- Keratotomy, 47.
- Keratitis, alphabet, 44.
  - bullous, 45.
  - dumb-bell, 44.
  - groove, 44.
  - hypopyon, 47.
  - marginal, 52.
  - neuro-paralytic, 44.
  - parenchymatous, 48, 49, 50.
  - trypanosome, 45.
- Kerato-conjunctivitis, 49.
- Keratoconus, 52.
- Kerato-iritis, 64, 69.
- Keratomalacia, 48.
- Keratometry, 3.
- Keratoplasty, 48, 51.
- Kharsivan, 226.
- Knife, 13.
- Krönlein operation, 12, 178, 192, 193.
- Laceration of cornea, 199, 202.
  - of globe, 216.
  - of optic disc, 212.
- Lacrimal apparatus, 159, 161, 216.
  - canal infection, 160.
  - caruncle, 163.
  - drainage, 159.
  - obstruction, 161.
  - sac, 159, 163.
  - stenosis, 160.
  - tumor, 180.
- Labyrinth, 21.
- Lamina cribrosa, 124.
- Lamps, 6, 237.
  - incandescent, 2, 6.
  - Nernst, 2.
  - therapeutic, 47.
  - tungsten, 2, 6.
- Larva, 180.
- Lead, 200, 210.
- Leber's disease, 131.
- Legislation, 250, 251.
- Lenses, binocular, 21.
  - colored, 240.
  - double focus, 21.
- Leprosy, 228, 234.
- Leucosarcoma, 187.
- Leukemia, 106, 229.
- Lids, 163, 164.
  - and jaw movements, 164.
  - elephantiasis of, 171.
  - coloboma of, 163, 217.
  - gangrene of, 167.
  - operations on, 39, 40, 172.
  - tumors of, 185.
- Ligation of vein, 176.
  - carotid artery, 175.
- Light, artificial, 236.
  - sense, 117.
  - therapy, 8.
- Lime, 51, 195.
- Localization, 134, 136, 208, 209.
- Longevity, 108.
- Lues, 128, 133.
- Lumbar puncture, 128.
- Lupus, 41, 169.
- Luxation of lens, 87.
- Lymphangioma, 185.
- Lymphendothelioma, 192.
- Lymphoma, 184.
- Macula, 105.
  - hole in, 105, 115.
  - pigmentation, 114.
- Magnet, 208.
  - ring, 210.
- Malaria, 69.
- Malingerer, 6, 14, 34, 118, 245.
- Masks, 182.
- Mastication, 164.
- Mastoiditis, 29.
- Maxwell operation, 182.
- Measles, 29, 222.
- Medico-legal, 248.
- Megalocornea, 81, 82.
- Melanoblastoma, 187.
- Melanomata, 189.
- Melanosarcoma, 189, 194.
- Mendelian law, 218.
- Meningitis, 24, 32, 69, 73, 127, 130, 223.
- Mentally defective, 220.
- Mercury cyanid, 9.
- Metabolism, 176.
- Metamorphopsia, 133.
- Metastases, 153, 154, 191.
- Metastatic ophthalmia, 61, 63, 71.
- Methyl alcohol, 124, 131.
- Microphthalmos, 59, 152.
- Migrain, 233.
- Military service, 245.
- Miners' nystagmus, 27.
- Miosis, 56.

- Miotics, 80.  
 Mirror writing, 135.  
 Mongolian idiocy, 90, 116.  
 Monocular blindness, 183.  
 Mooren's ulcer, 45, 46.  
 Mouth disease, 230.  
 Movements, see Ocular Movements.  
 Moving pictures, 238.  
 Mucocoele, 162, 180, 231.  
 Multiple sclerosis, 231.  
 Mules' operation, 158.  
 Muscle exercises, 6.  
   inferior rectus, 201.  
   lengthening of, 25.  
 Myasthenia gravis, 232.  
 Mydriatics, 6, 10, 80.  
 Mydriasis, 56.  
 Myiasis, 234.  
 Myopia, 17, 120.  
   school, 19.  
   statistics, 17.  
 Myotonia, atrophic, 90.  
 Myxoma, 192.  
  
 Naphthalin, 114, 167.  
 Narcosis, 12.  
 Nasal disease, 56, 126, 130, 230, 231.  
   see also Sinus disease.  
 Necropsy, 142.  
 Negro, 220.  
 Neosalvarsan, 1, 226.  
 Nephritis, 112, 126, 131.  
 Nernst lamp, 2, 68.  
 Nervous disease, 20, 212, 225, 232.  
 Neuroblastoma, 191.  
 Neuroepithelioma, 191.  
 Neuroretinitis, 114.  
 Nevus, 125.  
   pigmented, 184.  
 Night blindness, 116, 118, 150.  
 Nitrophenol, 123.  
 Nomenclature, 251.  
 Nutrition, 230.  
 Nyctalopia, 149.  
 Nystagmus, 27, 90.  
  
 Occlusion of pupil, 57.  
 Occupation, 215, 247.  
 Ocular movements, 21, 218.  
   abnormal, 24.  
   reactions, 6.  
 Oculo-cardiac reflex, 3, 234.  
 One-eyed, 183.  
 Opacity of cornea, 50, 51.  
   of lens, see Cataract.  
   of vitreous, 102.  
 Opaque optic nerve fibers, 125.  
 Operations, 12, 13.  
   Barraquer's, 156.  
   Beren's, 42.  
   cataract, 93.  
   corneal, 13, 48, 51.  
   Elliot's, see Corneo-scleral trephining.  
   glaucoma, 85, 86.  
   Heisrath-Kuhnt, 40.  
   Krönlein's, 12, 178, 192, 193.  
   lacrimal, 159, 161, 163.  
   Lagrange, 85.  
   magnet, 210.  
   Mules', 158.  
   on brain, 127, 128, 144, 213.  
   on lids, 39, 40, 172.  
   on muscles, 25.  
   on orbit, 12, 178, 192, 193.  
   plastic, 173, 217.  
   Smith-Indian, 93, 94, 95, 98, 99.  
   Toti's, 163.  
   trachoma, 40, 41, 42.  
   transplantation, 13, 48, 51, 156, 158, 186, 208.  
 Ophthalmia, electric, 35.  
   neonatorum, 31, 251.  
   sympathetic, 61.  
 Ophthalmic examinations, 249.  
 Ophthalmocardiac, reflex, 234.  
 Ophthalmology, chair of, 249.  
 Ophthalmometer, 3.  
 Ophthalmomyiasis, 33, 234.  
 Ophthalmoplegia, 23, 29, 127, 233.  
 Ophthalmoscope, 1, 6.  
 Ophthalmoscopy, 156, 226.  
 Optical glass, 14.  
 Optic disc, 1, 128, 129.  
   neuritis, 129, 179, 227.  
   tracts and centers, see Visual tracts and centers.  
 Optic nerve, 124, 125, 129.  
   anatomy of, 124.  
   anomaly of, 125.  
   atrophy of, 130, 131.  
   coloboma of, 126.  
   hemorrhage into, 124.  
   rupture of, 197.  
   tumors, 191.  
   sheath, 191.  
 Opticians, see Optometry.  
 Optico-ciliary vein, 102.  
 Optics, 249.  
 Optochin, see Ethylhydrocuprein.  
 Optometer, 15.  
 Optometry, 250.  
 Optophorometer, 15.  
 Optotypes, 245.  
 Oral disease, 230.  
 Ora serrata, 120.  
 Orbit, 180, 181.  
   anatomy of, 174.  
   echinococcus cyst, 180.  
   edema of, 234.  
   fly-blown, 180.  
   mucocoele of, 180.  
   rodent ulcer, 181.  
   syphilis of, 181.  
   tuberculosis of, 180.  
   tumors of, 192.  
 Orbital abscess, 128, 180.  
   cellulitis, 179, 180.  
   cyst, 178.  
   exostosis, 193.  
 Organotherapy, 7, 11.  
 Ossification, 193.  
 Osteoma, 192.  
 Otitis, 29.  
   media, 128.  
 Oxycephaly, 102, 131, 141.  
  
 Paint, 123.  
 Pannus, 186.  
 Panophthalmitis, 153, 154.  
   metastatic, 153, 154.



- Papilledema, 126, 127, 129.  
 Papillomata, 163, 185, 186.  
 Paraffin, 12, 13.  
   film, 13.  
 Paralysis, 56, 116, 128, 129.  
 Parasites, 234.  
 Parenchymatous keratitis, 48, 49, 50.  
 Parinaud's conjunctivitis, 40.  
 Pasteurization, 47.  
 Pathology, 105, 217.  
 Pellagra, 141.  
 Pemphigus, 42.  
 Perception of depth, 4, 22, 104.  
   macular, 90.  
 Periphelebitis, 116.  
 Perimeter, 5.  
 Perimetry, 5, 143.  
 Periostitis, 126.  
 Phlyctenular disease, 230.  
 Photometry, 5, 148.  
 Photophobia, 149.  
 Phylacogen, 57, 82.  
 Pigmentation, 90, 114, 219.  
 Pilocarpin, 84.  
 Pituitary body, *see* Hypophysis.  
 Plague, 33, 69, 223.  
 Plasmoma, 40.  
 Plastic operations, 173, 217.  
 Pneumococcus infection, 32, 33.  
   conjunctivitis, 33.  
 Pneumonia, 10, 65, 122, 130, 224.  
 Polyarthrititis, 64, 65.  
 Polycoria, 59.  
 Polycythemia, 112, 228.  
 Porges' reaction, 225.  
 Post-mortem ophthalmoscopy, 5.  
 Potassium iodid, 91, 92.  
 Pregnancy, 111.  
 Presbyopia, 21.  
 Pressure, blood, 6, 80, 84, 107.  
 Prevention of blindness, 239, 241.  
 Prisms, 24.  
 Proptosis, 174, 194.  
 Protective glasses, 239, 240, 246.  
 Protein-milk, 7, 38.  
 Prothesis, 156, 158, 181, 182.  
 Psammoma, 192.  
 Pterygium, 186.  
 Ptosis, 165, 223, 233.  
 Pulsation, arterial, 107.  
 Pupil, 54.  
   Argyll-Robertson, 56, 164, 232.  
   dilation of, 56.  
   inequality, 56, 141.  
   movements, 55.  
   occlusion of, 57.  
   reactions of, 24, 56, 231.  
 Pupillary membrane, 55, 88.  
 Purkinje phenomenon, 104.  
 Pyoktanin, 161, 162.  
 Pyorrhea alveolaris, 62, 101.  
   changes in, 17.  
 Renal disease, 230.  
 Resorption of cataract, 91.  
 Retina, 102, 113, 136, 147.  
   anatomy of, 102.  
   angioid streaks in, 113.  
   pigmentation of, 113, 229.  
 Retinal aneurysm, 116.  
   angiopathy, 106.  
   arteries, 103.  
   degeneration, 114, 116.  
   detachment, 118, 120.  
   embolism, 110, 111.  
   fatigue, 104.  
   glioma, 142, 146, 190, 191, 192.  
   hemorrhage, 108.  
   leukemia, 106.  
   periphelebitis, 116.  
   pulsation, 107.  
   scotoma, 114.  
   stimulation, 4, 104, 148.  
   thrombosis, 110, 111.  
   tuberculosis, 108, 109.  
   tumors, 102, 146, 190, 191, 192.  
   veins, 102, 110, 125.  
 Retinitis albuminuric, 107, 111, 112.  
   exudative, 109.  
   pigmentosa, 113, 229.  
   proliferans, 109.  
   renal, 107, 111, 112, 113.  
   solar, 114.  
   syphilitic, 110.  
   toxemic, 112.  
 Retinochoroiditis, 115, 116.  
 Retrobulbar neuritis, 126, 231.  
 Reverse seeing, 115.  
 Rhabdomyoma, 192.  
 Rheumatism, 63, 64, 92.  
 Rhinitis, 179.  
 Rodent ulcer, 181.  
 Roentgen ray, 3, 177, 219.  
 Rupture of choroid, 196, 197.  
   eyeball, 199.  
   iris, 196.  
   optic nerve, 196, 197.  
   retina, 196.  
 Salvarsan, 131.  
 Sarcoid of eyelid, 184.  
 Sarcoma, 186, 187, 188, 192, 194.  
 Scarlet fever, 222.  
 Scars, 185, 219.  
 Schiötz' tonometer, 2.  
 Schlemm's canal, 79.  
 School hygiene, 19.  
 Sclera, 52.  
   blue, 52, 53.  
   resection of, 53.  
 Sclerecto-iridectomy, 83, 85, 120.  
 Sclerotomy, 53, 120.  
 Scleritis, 53, 64.  
 Sclero-corneal trephining, 85, 86.  
   infection after, 86.  
 Sclerosis, 231.  
   disseminated, 232.  
 Scotoma, 114, 137.  
 Scrofuloderma, 69.  
 Sella turcica, 143.  
 Senile changes, 230.  
 Sepsis, 92, 154.

- Serotherapy, 7, 11.  
Serpent ulcer, 181.  
Shield, 13, 240.  
Shot wounds, 138, 211, 213, 248.  
Sideroscope, 209.  
Siderosis, 90, 206.  
Silver compounds, 10.  
Simulation, 6, 14, 34, 118, 245.  
Sinus disease, 127, 130, 179, 181, 230, 231.  
Skiascopy, 14.  
Smith-Indian operation, 93, 94, 95, 98, 99.  
Snow-blindness, 238.  
Sociology, 241, 252.  
Socket, 158, 182, 220.  
Soldiers, eye-sight of, 245.  
Somatic changes, 220.  
Sophol, 32.  
Spectacles, 185, 201, 202, 240.  
Spectrum, 5, 148, 150.  
Sphygmomanometer, 103.  
Spirochetosis, 110.  
    icterohemorrhagic, 9, 110, 222.  
Spirochetes, 133.  
Sporotrichosis, 226.  
Squint, 33.  
Squirrel plague, 33.  
Staining, 43, 46, 51.  
Standardization of test cards, 3, 4.  
    vision, 245.  
Staphyloma, 51, 84.  
Statistics, 214, 216, 245, 251, 252.  
Stenopaic slit, 240.  
Stereoscope, 22, 135.  
Sterilization, 12.  
Stereoscopic slate, 5, 47.  
    vision, 134.  
Strabismus, 25, 33.  
Streptothrix, 33, 227.  
Subconjunctival cyst, 43.  
    hemorrhage, 105, 198.  
    injections, 9, 12, 91.  
Suction method, 94.  
Suppuration, 91, 127.  
Suture, 39, 93.  
Symblepharon, 42, 43, 171.  
Sympathetic disease, 75, 233.  
    ophthalmia, 61, 76, 77.  
Syndrome, Claude-Bernard-Horner, 213.  
Syphilis, 67, 110, 130, 131, 169, 181, 224.  
Syringe, 94.  
Systemic disease, 6, 230, 234.  
    remedies, 11.  
  
Tabes, 131, 132, 231.  
Tarsus, 40.  
Tattooing, 50, 51.  
Teeth, 20, 61, 62, 126, 225, 230.  
Temperature, 6, 227.  
Tenonitis, 178.  
Tenotomy, 25.  
Tension, 83, 103, 128.  
Test, frame, 15.  
    type, 4, 245.  
Tetanus, 200.  
Tetryl conjunctivitis, 35.  
Thelaziasis, 236.  
Therapeutics, 7, 106.  
Thermotherapy, 8, 9.  
Thiosinamin, 101.  
Thread drainage, 162.  
  
Thrombosis, retinal, 110, 111.  
    sinus, 181, 231.  
Thyroid, 52, 114, 229.  
Tonometer, 2, 81.  
Tonometry, 2, 81.  
Tonsillitis, 63, 129.  
Toxemia, 112, 177, 223.  
Toxic amblyopias, 121.  
    alcohol, 124, 131.  
    ethylhydrocuprein, 122.  
    lead, 124.  
    malaria, 69.  
    nitrophenol, 123.  
    optochin, 122.  
    paint, 123.  
    quinin, 121.  
    tobacco, 126.  
Trachoma, 37, 251.  
Training of blind, 241.  
Transillumination, 2, 189.  
Transplantation, 13, 48, 51, 156, 158, 182, 208.  
Travers, 241.  
Trepining, 85, 86.  
Trial case, 15.  
Triplex glass, 239, 246.  
Trichiasis, 171.  
Trypanosomes, 45.  
Tubercle of cornea, 228.  
Tuberculin, 7, 76.  
Tuberculosis, 49, 67, 68, 169, 180, 227.  
    conjunctiva, 41.  
Tularensis conjunctivitis, 33.  
Tumors, 145, 184, 185, 190.  
    brain, 145, 146.  
    choroidal, 187, 188.  
    conjunctival, 185, 186.  
    corneal, 186.  
    iris, 187.  
    lacrimal, 180, 184, 231.  
    lids, 185.  
    limbus, 186.  
    hypophysis, 145.  
    intraocular, 188.  
    optic nerve, 191.  
    orbital, 192.  
    osseous, 193.  
    retinal, 142, 146, 190, 191, 192.  
    scleral, 192.  
    uveal tract, 188.  
Typhoid fever, 222.  
  
Ulcer of cornea, 45, 46.  
    rodent, 181.  
Ultraviolet radiation, 89, 195, 215, 237.  
Urates, 66, 72.  
Uremia, 230.  
Uveal parotid fever, 69.  
Uveal tract, 57, 65.  
    tumor of, 188.  
Uveitis, 61, 71, 72, 227.  
  
Vaccination, 45, 144, 168, 222.  
Vaccine therapy, 7, 11, 222.  
Vaccinia, 45.  
Varicella, 45.  
Variola, 45.  
Vascular disease, 107, 108.  
    nevi, 125.  
Venereal disease, 224.  
Vernal catarrh, 36.

- Vertigo, 233.
- Vincent's infection, 224.
- Vision, central, 134.
  - conservation of, 239, 241.
  - inverted, 115.
  - perspective, 134.
  - standards of, 245.
  - theory of, 146.
- Visual acuity, 3.
  - fields, 126, 138, 141.
  - illusions, 105.
  - requirements, 245.
  - stimulation, 148.
  - tracts and centers, 133, 212.
- Vitiligo, 68.
- Vitreous, 100, 101, 201, 244.
  - hemorrhage, 101, 196.
  - loss of, 100.
  - opacity, 101, 102.
  - replacement, 100.
- Vocational training for blind, 201, 243, 244.
- von Hippel's disease, 115.
- War blind, 201, 243, 244.
  - injuries, 77, 155, 246.
  - nephritis, 112, 126, 131.
- Wassermann reaction, 135, 222, 224.
- Weil's disease, 223.
- Welfare of blind, 243.
- Window resection, 162.
- Winking reflex, 164.
- Word blindness, 134.
- Workingmen's compensation, 247, 248.
- Wounds, shot, 138, 211, 213, 248.
- Writing for blind, 242.
- Xerophthalmia, 48, 230.
- Xerosis, 43.
- X-ray, see Roentgen rays.
- Yellow spot, 205.
- Zellon, 246.
- Zoster, 44, 45, 83, 167, 168, 232.







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